National Center for Healthy Housing

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National Healthy Housing Standard

National Healthy Housing Standard

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Foreword and Acknowledgments

FOREWORD

Housing is one of the best known and documented determinants of health. The affordability, location, and quality of housing have all been independently linked to health. Poor quality housing and blighted neighborhoods diminish property values, increase crime, and erode the cohesiveness and political power of communities. Despite the critical role of housing in public health, attention to U.S. housing conditions remains incommensurate with its importance to our wellbeing. One illustration of this is the number of homes in substandard condition. Despite setting a national goal in Healthy People 2010 to reduce the number of units in substandard condition by 52 percent, we have made no progress. There were 6.3 million units in substandard conditions in 2001; 6.3 million units remain substandard in 2011 according to the most recent American Housing Survey.

More than a century ago, growing concern about the toll of infectious diseases such as tuberculosis, typhoid, and dysentery in America spurred a national public health movement aimed at eradicating inadequate housing conditions. The effort yielded important housing improvements that dramatically curbed the outbreak of communicable diseases. In the decades that followed, the public health community became less involved with housing as separate governmental departments were established to develop and enforce housing and building codes. This separation of public health and housing has challenged the nation's ability to mount a successful campaign to improve the quality of housing and neighborhoods.

We at the National Center for Healthy Housing (NCHH) and the American Public Health Association (APHA) have created this evidence-based National Healthy Housing Standard as a tool to reconnect the housing and public health sectors and as an evidence-based standard of care for those in the position of improving housing conditions. We have drawn from the latest and best thinking in the fields of environmental public health, safety, building science, engineering, and indoor environmental quality.

Our focus in the National Healthy Housing Standard is the over 100 million existing homes in our country that offer the most significant opportunity to protect public health and reduce health disparities. Although new homes are typically safer and healthier, having been built to modern building standards, technologies and regulations, and to ever-changing consumer expectations, the new construction market remains a fraction of the overall housing stock in the country. In contrast, regulations and industry practices affecting existing owner-occupied and rental housing, the focus of this document, have not kept pace with our knowledge about housing-related disease and prevention of disease and injury through routine maintenance.

The consequences of not dealing with substandard housing are dire in both human wellbeing and cost:

- About 20-30 percent of asthma cases are linked to home environmental conditions.
- 21,000 lung cancer deaths result from radon in homes.
- Over 24 million homes that have lead-based paint hazards put children at risk of the irreversible disease of childhood lead poisoning.
- Home injuries are the leading causes of death for young children and put 6 million adults over 65 in hospitals and nursing homes due to preventable falls.

We can do better. We can make our homes smart, at least as smart as our phones. For example, carbon monoxide detectors can alert us to life threatening situations. Modern efficient ventilation systems can keep us comfortable, control humidity, and provide clean fresh air. More resilient homes can handle climate chaos, withstanding storms and wild swings in temperature with proper insulation, air sealing, structural integrity, and moisture control and more. Grab bars, handrails, and ample lighting will help accommodate our aging population. These are the homes in which today's families want to live and grow old and that future generations deserve.

We know that to bring about our vision of ensuring that all people live in safe and healthy homes, we will need to marshal political will and financial resources. Regulations are one important way to address unhealthy housing, but we can also achieve our vision by arming the private sector with the right information. In every community, property

owners, advocates, code officials, public health leaders, and others are positioned to recognize and coordinate their shared missions of keeping people safe and healthy in the places they live. We hope the Standard will inspire action and cross sector collaboration. Most of all, we hope through the implementation of this Standard we will save lives, shrink disparities, and ensure our nation's homes are the safe havens they were meant to be.

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Sections of the 2012 Model Codes (copyright 2011) are reproduced with the permission of the International Code Council, Washington, DC, www.ICCSAFE.org, all rights reserved:

- Sections 302.2, 302.6, 303.2, 303.18.1, 304.2, 305.4, 402.1, 402.2, 403.1, 403.2, 403.5, 404.3, 404.4.3, 505.4, 602.2.2, 602.2.3, 603.2, 603.3 of the 2012 International Property Maintenance Code.
- Section 1210.2 of the 2012 International Building Code.
- Sections 907.2.11.2, 907.2.11.3 of the 2012 International Fire Code.
- Sections 424.3, 424.5, 501.6, 504.4, 504.6 of the 2012 International Plumbing Code.
- Sections E3901, E3902.1, M1901.1, P2713, P2708.3, P3009, R310.1, R310.2, R310.2.1, R311.7.5, R311.7.8, R312.1.1, R312.1.2, R312.1.3, R312.2.1 of the International Residential Code.

USING THIS DOCUMENT

The Standard provides health-based provisions to fill gaps where no property maintenance policy exists and also a complement to the International Property Maintenance Code and other policies already in use by local and state governments and federal agencies for the upkeep of existing homes. The Standard bridges the health and building code communities by putting modern public health information into housing code parlance. The Standard is written in code language to ease its adoption, although we anticipate that states, localities, and other users will tailor it to local conditions.

The Standard consists of seven chapters and a section of definitions. The annotated version of the Standard explains the public health rationale for each provision, and provides references and resources for more information. Individually and together, the Standard constitutes minimum performance standards for a safe and healthy home. In developing the Standard we found a variety of provisions that could be added to further enhance the health and safety of the home, but that would be difficult to achieve during property maintenance due to cost or feasibility. We have included those provisions as "stretch" measures for users who want to go above the minimum requirements or who can integrate compliance with the provisions during property renovation. We encourage the adoption of the stretch provisions wherever feasible.

Requirements and Stretch Provisions

1. DUTIES OF OWNERS AND OCCUPANTS

1.1. Duties of Owners.

The owner has the duty to ensure that the structure, dwelling, dwelling unit, common areas, and premises are maintained in a safe and healthy condition, in compliance with this Standard and other applicable requirements.

1.1.1. The owner shall ensure the collection of trash and recyclables and provide and maintain trash containers, bulk storage containers, recycling containers, and areas where the containers are stored.

1.1.2. The owner shall maintain the building and premises to keep pests from entering the building and dwelling units, inspect and monitor for pests, and eliminate pest infestation in accordance with integrated pest management methods.

1.1.3. The owner shall provide occupants with at least 48 hours written notice of the planned use of a chemical agent such as a pesticide or herbicide, the date and location of application, and a copy of the warning label.

1.1.4. The owner shall not cause or allow any water, sewage, electrical, or gas service, facility, or equipment required for safe and healthy occupancy to be removed, shut off, or discontinued for any occupied dwelling, except for such temporary interruption as may be necessary while repairs or alterations are being performed, or during temporary emergencies requiring discontinuance of service. This provision does not apply where the occupant has contractual control over the service and shall not be interpreted as preventing a utility company from discontinuing service for reasons allowed by law.

1.1.5. The owner shall investigate occupant reports of unsafe or unhealthy conditions, respond in writing, and make needed repairs in a timely manner.

1.2. Duties of Occupants.

The occupant shall properly use and operate the dwelling unit and owner-supplied fixtures and facilities controlled by the occupant in order to maintain a safe and healthy environment within the dwelling unit, and report unsafe or unhealthy conditions, including breakdowns, leaks, and other problems requiring repair to the owner in a timely manner.

1.2.1. The occupant shall place trash and recyclables in the appropriate containers.

1.2.2. The occupant shall work with the owner to ensure pest-free conditions in accordance with integrated pest management.

1.2.3. If the occupant's action leads to pooling of water or another excessive moisture problem inside the dwelling unit, the occupant shall clean up and dry out the area in a timely manner.

2. STRUCTURE, FACILITIES, PLUMBING, AND SPACE REQUIREMENTS

2.1. Structure.

Every foundation, roof, floor, exterior and interior wall, ceiling, inside and outside stair, porch, trim, accessory structure, fence, door, window, and window glass shall be safe to use and capable of supporting the intended design loads and load effects and shall be in good condition.

2.2. Facilities.

Every plumbing fixture and pipe, chimney, flue, smoke pipe, and every other facility, piece of equipment, or utility shall be installed in conformance with applicable statutes, ordinances, and regulations.

2.2.1. Mechanical, utility, and heating equipment shall be separated from habitable rooms. In multifamily buildings, equipment rooms shall be locked.

2.3. Plumbing System.

Every plumbing fixture, stack, vent, water, waste, and sewer pipe shall be properly installed, maintained in a safe and functional order, and kept free from obstructions, leaks, and defects.

2.3.1. An approved potable water supply system shall provide an adequate amount of running water under pressure to all fixtures simultaneously.

2.3.2. An adequate supply of heated running water under pressure shall be supplied to sinks, bathtubs, showers, and laundry facilities. Water heaters shall be set at a minimum temperature of 110° F (43° C). At bathtub faucets and shower heads, the maximum temperature shall be 120° F (49° C). Heated water shall be provided by either a tank-type or tankless water heater. A tank-type water heater shall have a temperature/pressure relief valve that discharges to a drip pan, storage tank, or the outside. The temperature of water discharged from a tankless water heater shall not exceed 140° F (60° C).

2.3.3. Every waste pipe shall be connected to a public sewer system, an approved private sewage disposal system, or the dwelling's graywater system. No toilet waste pipe shall be connected to a graywater system. The drainage system shall have a cleanout.

2.3.4. Faucet discharge points shall be located above the overflow rim of sinks, tubs, or other fixtures that collect water.

Stretch Provisions:

- Bathtub and shower faucets shall have anti-scald devices, such as an automatic temperature control mixing valve, water temperature limiting device, or temperature-actuated flow reduction valve.
- Each dwelling unit in multifamily housing shall have a separate meter for water supplied to the unit.
- Multifamily housing with one or more central water heaters shall comply with ASHRAE Standard188P to assess and manage the risks associated with *Legionella* in building water systems.
- A private water supply shall be tested annually to ensure that water does not have biological or chemical contaminants.
- If there is a suspected risk of excessive lead in drinking water supplied by a public water utility, the water shall be tested. The risk factors shall include, but are not limited to, presence of an occupant with a blood lead level of five micrograms per deciliter or more, pipes made of lead or leaded brass, test results indicating that the lead level in the public water supply exceeds federal limits, and plumbing repair work that has disturbed water supply components (such as faucets, valves, pipes, meters, pressure regulators, backflow preventers, lead-soldered joints, or service lines). If the lead level in the water sample exceeds 15 parts per billion, there shall be an investigation of the possible sources(s) to determine the appropriate course of action. If warranted, lead and brass-containing components shall be replaced.

2.4. Kitchen.

Every dwelling unit shall have a kitchen equipped with the following:

2.4.1. A kitchen sink in good working condition that is properly connected to heated and unheated water supplies and waste pipes. Any provided dishwasher and components of the sink, including disposal and water filtration devices, shall be in good working condition and properly connected.

2.4.2. A counter for food preparation and cabinets and/or shelves sufficient to store occupants' food that does not require refrigeration and eating, drinking, and food preparation equipment. Cabinets shall have tight-fitting doors and no gaps between any surfaces. The counter, countertop edges, cabinets, and shelves shall be of sound construction and furnished with surfaces that are impervious to water, smooth, and cleanable.

2.4.3. A range for cooking food. The range shall be properly installed with all necessary connections for safe and efficient operation and shall be maintained in good working condition.

2.4.3.1. The range shall include an oven unless both a separate oven, other than a microwave oven, and a cooktop are provided. A hot plate is not an acceptable substitute for burners on a range or cooktop. The range or cooktop shall have a vertical clearance of not less than 30 inches (762 mm) from above its surface to unprotected combustible material. Reduced clearances are permitted in accordance with the listing and labeling of the range hood.

2.4.3.2. Ventilation for the range shall be provided in accordance with Subsection 5.3.

2.4.4. A refrigerator with a freezer. The refrigerator shall be in good working condition, of sufficient size to store occupants' food that requires refrigeration, and capable of maintaining a temperature less than 41° F (6° C) but more than 32° F (0° C). The freezer section shall be capable of maintaining a temperature below 0° F (-18° C).

2.4.4.1. If the lease does not provide for a refrigerator, adequate connections for the occupant's installation and operation of a refrigerator shall be provided.

2.4.5. A kitchen floor in good condition with a sealed, water-resistant, nonabsorbent, and cleanable surface.

Stretch Provisions:

- Cabinets and countertops shall be constructed of materials that are rated No-Added Formaldehyde (NAF) or Ultra-Low-Emitting Formaldehyde Resins (ULEF).
- Wall surfaces immediately adjacent to the range, sink, and counter shall be covered with an impervious finish.
- The joints where a wall meets a cabinet or counter, and where a counter meets a stove or sink, shall be sealed or covered to permit thorough cleaning and deter pests.
- Enclosed cabinets (as opposed to a combination of shelves and cabinets) sufficient to store occupants' food that does not require refrigeration shall be provided.
- Freestanding stoves shall have brackets to prevent tip-over.

2.5. Bathroom.

Every dwelling unit shall have a private bathroom equipped with the following:

2.5.1. A toilet in good working condition that is sealed to the waste pipe and affixed to the floor and properly connected to both the dwelling's water supply and a waste pipe leading to an approved sewage system or private waste disposal system.

2.5.2. A sink in good working condition, with a stable connection to the wall or secure attachment to the floor that is properly connected to the heated and unheated potable water supply and a sealed trap leading to a waste pipe.

2.5.3. A bathtub or shower in good working condition that is properly connected to the heated and unheated potable water supply and a waste pipe. The bottoms of bathtubs and shower floors shall have permanent or removable nonslip surfaces.

2.5.4. Cleanable nonabsorbent water-resistant material on floor surfaces and extending on bathroom walls at least 48 inches (122 cm) above a bathtub and 72 inches (183 cm) above the floor of a shower stall. Such materials on walls and floors shall form a watertight joint with each other and with the bathtub or shower.

2.5.5. Ventilation for the bathroom provided in accordance with Subsection 5.3.

Stretch Provisions:

- Grab bars shall be firmly anchored to the wall adjacent to each bathtub, shower, and toilet in accordance with the Americans with Disabilities Act Design Guidelines.
- Tub and shower enclosures composed of tile or panel assemblies with caulked joints shall be installed over moisture-resistant backing material, such as cement board. Paper-faced wallboard shall not be used behind such tub and shower enclosures. Monolithic tub and shower enclosures (e.g., fiberglass with no seams) are exempt from these limitations unless required by the manufacturer.

2.6. Minimum Space.

The dwelling shall provide privacy and adequate space for sleeping and living.

2.6.1. A bedroom shall not be the only passageway to the only bathroom in a dwelling unit with more than one bedroom.

2.6.2. A bathroom or toilet room shall not be the only passageway to any habitable room, hall, basement, or the exterior of the dwelling.

2.6.3. Every habitable room shall have a minimum floor area of 70 ft^2 (6.5 m^2).

2.6.4. Every dwelling shall have closet space or other storage space to store occupants' clothing and personal belongings.

2.6.5. The ceiling height of any habitable room shall be at least 84 inches (213 cm). In a habitable room with a sloping ceiling, at least one-half of the floor area shall have a ceiling height of at least 84 inches (213 cm). If any part of a room has a ceiling height lower than 60 inches (152 cm), its floor area shall not be considered in computing the floor area of the room.

2.6.6. A habitable room located partly or totally below grade shall be provided with natural light by windows in accordance with Subsection 4.3, and ventilation in accordance with Subsection 5.3. In such a room, the ceiling and any ducts, pipes, and other obstructions shall be at least 84 inches (213 cm) above the floor throughout the room, and walls and floors shall be waterproof and free of dampness.

2.7. Floors and Floor Coverings.

Floors and floor coverings shall be attached at each threshold, maintained in safe and healthy condition, capable of being cleaned, and free of bulges and buckling. Carpets shall have no tears, folds, or bumps.

Stretch Provisions:

- Floor coverings shall consist of low-pile carpet or nonabsorbent material such as hardwood, tile, or resilient flooring. Carpet and other floor coverings shall be certified as having low volatile organic compound (VOC) emissions, and any adhesives, padding, or other materials used in installing the floor covering shall be certified as having no VOCs or low VOC emissions, and having no perfluorocarbons or halogenated flame retardants.
- Walk-off entry mats shall be provided inside or outside each entryway that leads to the outdoors.

2.8. Noise.

The structure and facilities shall be maintained so that the noise level in the interior of the dwelling unit caused by exterior sources is below 45 dB L_{dn} (day-night equivalent sound level).

Stretch Provisions:

- Nighttime noise levels within bedrooms shall not exceed 30 dB LA_{eq} measured over eight hours.
- HVAC equipment, including intermittent ventilation fans, shall operate at a noise level that creates no more than 45 dB L_{dn} in habitable rooms.
- Wall and ceiling assemblies shall meet performance standards to attenuate exterior sound reaching occupants or be constructed using materials with sound-dampening acoustical properties.
- Roof material, chimney baffles, exterior doors, mail slots, attic ventilation ports, wall-mounted air conditioners, and other building components that have the potential to admit excessive noise shall be configured to minimize sound intrusion.
- Windows shall be sealed, made weathertight, and caulked to minimize sound intrusion when closed.

3. SAFETY AND PERSONAL SECURITY

3.1. Egress.

In accordance with local fire codes, every dwelling unit shall have at least two means of egress that serve as emergency escapes and rescue openings. Each egress shall lead outside without passing through another dwelling unit.

3.1.1. Egress routes shall be unobstructed. Doors along egress routes shall be openable from the inside without the use of a key or tool.

3.1.2. Any bedroom located below the fourth floor shall be provided with an exterior window openable from the inside that can be used as a means of emergency egress.

3.1.3. If a habitable room partly or totally below grade is intended for sleeping purposes, at least one exterior window shall be openable from the inside and accessible for easy and ready use as an emergency exit. The window shall have the following minimum dimensions: a net clear opening of 5.7 ft^2 (0.53 m^2); 24 inches (61 cm) from the top of the sill to the bottom of head of the window frame; a width of 20 inches (51 cm); and a sill height of not more than 44 inches (112 cm) from the floor.

3.1.3.1. If the window opening sill height is below ground elevation, the horizontal dimension (width times projection) of the window well shall be at least nine ft^2 (0.84 m^2) and the horizontal projection shall extend at least 36 inches (91 cm) from the exterior side of the window.

3.1.3.2. If the egress window well is deeper than 44 inches (112 cm) below ground elevation, there shall be steps or a ladder permanently attached to serve as an emergency exit to ground elevation. The distance between steps or rungs shall be 18 inches (46 cm), their width shall be at least 12 inches (31 cm), and their projection from the wall shall be between three and six inches (7.6 and 15 cm).

3.1.3.3. A door leading directly from the room to the outside that provides an exit at grade level shall fulfill this requirement.

3.2. Locks/Security.

Means of egress (i.e., windows and/or doors) from dwellings shall have locks.

3.2.1. Following each change in tenancy, the locking devices on the dwelling unit entry doors shall be changed.

3.2.2. Dwelling unit entry doors shall be equipped with a dead bolt lock with a minimum throw of one inch (2.54 cm) and that is capable of being opened from the interior side without a key and a device that permits the occupant to see a person at the entry door without fully opening the door.

3.2.3. Exterior doors on multifamily buildings with a common entry that leads into a foyer or hallway shall have a self-closing mechanism and shall be equipped with a locking device capable of being opened from the interior side without a key.

3.2.4. Exterior windows that are capable of being opened and are potential means of entry shall be equipped with a lock on the interior side.

3.3. Smoke Alarm.

Every dwelling unit shall have a functioning smoke alarm located on the ceiling outside each sleeping area in the immediate vicinity of the bedrooms, in each additional room used for sleeping purposes, and on every level except crawlspaces and uninhabitable attics. In dwellings or dwelling units with split levels that have no door between adjacent levels, the smoke alarm installed on the upper level shall suffice for the adjacent lower level. In the event a smoke alarm sounds, the cause of the alarm condition shall be identified and corrected.

3.3.1. In multifamily housing, a tamper-proof smoke detection system (interconnected with a central fire alarm system) or stand-alone smoke alarms in good working condition shall be installed on each level including basements, in heating system and storage rooms, in garages, and in other common areas.

3.3.2. Battery-operated smoke alarms and the battery backup for hardwired smoke alarms shall be powered with long-lasting batteries.

3.3.3. Alternative visual notification shall be provided for hearing-impaired occupants.

Stretch Provisions:

- Smoke alarms shall be hardwired with battery backup.
- Smoke alarm batteries shall be sealed-in and tamper-proof.
- Multiple smoke detection stations shall be interconnected.
- Every dwelling unit shall have both a photoelectric smoke alarm and an ionization smoke alarm.

3.4. Fire Extinguisher.

Fire extinguishers shall be rated Class ABC and shall be readily accessible.

3.4.1. Each dwelling unit shall have at least one 10-pound fire extinguisher in good working condition in or near the kitchen.

3.4.2. In multifamily housing, there shall be fire extinguishers in common areas on each floor and in areas where flammable or combustible liquids are stored, used, or dispensed. The fire extinguishers shall be located in conspicuous, unobstructed locations that are not obscured from view.

Stretch Provision:

- The dwelling shall have an automatic fire sprinkler system that complies with the applicable locally adopted fire code. If the local fire code has no sprinkler requirement or if no local fire code exists, the installed automatic fire sprinkler system shall comply with either the International Fire Code© or the National Fire Protection Association Standard 1.

3.5. Carbon Monoxide Alarm.

Every dwelling unit shall have at least one functioning carbon monoxide (CO) alarm on every habitable floor and outside each separate sleeping area, in the immediate vicinity of every bedroom. In the event a CO alarm sounds, the cause of the alarm condition shall be identified and corrected.

3.5.1. Battery-operated CO alarms shall be powered with long-lasting batteries. Hardwired CO alarms shall have long-lasting battery backup.

3.5.2. Alternative visual notification shall be provided for hearing-impaired occupants.

Stretch Provisions:

- CO alarms and combination smoke/CO alarms shall include voice notification.
- If a combination ionization sensor smoke/CO alarm is used, a second smoke alarm utilizing photoelectric smoke sensors shall be installed.
- Smoke alarm batteries shall be sealed-in and tamper-proof.
- CO present at or above 30 ppm (35 mg/m^3) when measured over one hour, or above nine ppm (10.5 mg/m^3) measured over eight hours, shall be deemed hazardous. The cause of a hazardous indoor CO level shall be investigated to identify and eliminate its source.

3.6. Walking Surfaces.

Every interior and exterior stairway, ramp, deck, porch, and balcony shall be maintained structurally sound, in good repair, properly anchored, and capable of supporting the imposed loads.

3.6.1. Treads on exterior stairways shall have nonskid surfaces.

3.6.2. Every interior and exterior stairway with four or more risers shall have at least one structurally sound continuous handrail installed not less than 34 inches (86.7 cm) and not more than 38 inches (96.5 cm), measured vertically from above the nose of the tread. The handrail shall be firmly fastened, capable of supporting a load of 300 pounds, and in good condition. If a side of a stairway is open to the floor or grade below, and the handrail provides the guard required by Subsection 3.7, the rail shall be supported by balusters 34 to 38 inches (86.7 to 96.5 cm) in height, measured vertically from the nose of the tread.

Stretch Provisions:

- Every interior and exterior stairway shall have uniform risers and treads. Risers shall be no higher than 7¾ inches (19.6 cm) and treads shall be at least 10 inches (25.4 cm) deep, unless the existing space and construction do not allow a reduction in pitch or slope.
- Interior and exterior stairways shall have handrails on both sides. Railings shall have a graspable perimeter measuring four to six inches (10–16 cm), and if noncircular in shape, shall have no sharp corners and a width no smaller than five-eighths inch (1.5 cm).

3.7. Guards.

3.7.1. Every stairway, porch, patio, landing, and/or balcony located more than 30 inches (76.2 cm) above an adjacent area shall have a structurally sound guard between 30 inches (76.2 cm) and 42 inches (107 cm) high, measured vertically from the floor. The guard shall be firmly fastened, capable of supporting normally imposed loads, capable of being opened in case of emergency, and in good condition. Balusters with a minimum thickness of one-half inch (13 mm) shall be placed at intervals that do not allow passage of a sphere greater than four (10.2 cm) inches in diameter. There shall be no climbable cross pieces. If the balusters do not reach the floor, the narrowest opening between the bottom of the stair guard and the floor shall be a maximum of four inches (10.2 cm).

3.7.2. If the vertical distance from the top of the sill of an exterior window opening to the finished grade or other surface below is greater than 72 inches (183 cm), and the vertical distance from the top of the sill to the floor of the room is less than 36 inches (91.5 cm), the window shall have a fall prevention device compliant with ASTM F2006 or ASTM F2090.

3.7.2.1. The fall prevention device for a window that provides access to a fire escape or is otherwise designated for emergency egress shall be compliant with ASTM F2090.

3.8. Chemical Storage.

3.8.1. Each dwelling unit shall have a cabinet or other storage space that is lockable or not readily accessible to children for the storage of medicine and household chemical agents.

3.8.2. Storage space for flammable and combustible liquids shall be available either in a building separate from the dwelling's habitable space or in an adjacent space that is not connected to the dwelling's ventilation system.

3.9. Pools, Hot Tubs, and Other Water Features.

3.9.1. Swimming pools, hot tubs, spas (except a residential spa or hot tub with a safety cover complying with ASTM F 1346-91), ornamental ponds, and other water features that hold water more than 24 inches (61 cm) in depth shall be completely surrounded by a fence or barrier at least 48 inches (122 cm) in height above the finished ground level that is accessible only through a self-closing and self-latching gate. The gate's latch shall be located 54 inches (137 cm) above the bottom of the gate on the interior side of the gate facing the water feature. The fence and gate shall not have climbable crosspieces.

3.9.2. All pools and spas shall have anti-entrapment drain covers compliant with ANSI/ASME A112.19.8, ANSI/APSP 16-2011, or any successor standard, on every suction outlet.

3.9.3. Pool drains and drain covers shall be clearly visible and in good repair. Where there is a single main drain (other than an unblockable drain), a second anti-entrapment system shall be installed.

3.9.4. Luminaries, receptacles, and other outlets shall have ground fault circuit interrupter (GFCI) protection.

4. LIGHTING AND ELECTRICAL SYSTEMS

4.1. Electrical System.

Every dwelling unit shall have electric service, outlets, and fixtures that are grounded and installed properly, maintained in good and safe working condition, and connected to a source of electric power.

4.1.1. Every dwelling unit shall be supplied with a three-wire, 120/240-volt, single-phase electrical service that is not shared with another dwelling unit.

4.1.2. Temporary wiring or extension cords shall not be used as permanent wiring.

Stretch Provision:

- The electrical service shall have a rating of not less than 100 amperes.

4.2. Outlets.

Every habitable room shall have at least two separate and remote grounded duplex electric receptacle outlets.

4.2.1. Each kitchen and each room containing a toilet, sink, bathtub, or shower stall shall have at least one grounded duplex electric receptacle outlet protected by a ground-fault circuit interrupter (GFCI).

4.2.2. Receptacle outlets in garages, crawl spaces, unfinished basements, and outdoors shall be protected by GFCIs.

Stretch Provisions:

- Habitable rooms shall have sufficient electric receptacle outlets so that no location on a wall is more than six feet from an outlet.
- Every countertop space 12 inches (305 mm) or wider shall have a grounded duplex electric convenience receptacle outlet protected by a GFCI. No section of counter shall be more than 24 inches (610 mm) measured horizontally from an outlet.
- Receptacle outlets in habitable rooms that are not protected by GFCIs shall be protected by arc-fault circuit interrupters (AFCIs).

4.3. Natural Lighting.

Every habitable room shall receive daylight from at least one exterior window or skylight.

4.3.1. If a habitable room receives daylight from an adjacent room or area used seasonally, such as a porch, the daylight through this interconnection shall be available year-round.

4.3.2. Every bathroom and kitchen shall comply with the daylight requirement for habitable rooms contained in this section, unless the room is equipped with a ventilation system consistent with Subsection 5.3.

4.4. Artificial Lighting.

Each room containing a toilet, sink, bathtub, or shower stall shall contain at least one ceiling- or wall-type electric lighting fixture. Each non-habitable room, including laundry rooms, furnace rooms, and public halls, shall contain at least one ceiling- or wall-type electric lighting fixture.

4.4.1. Light switches that control ceiling- or wall-type electric light fixtures shall be located conveniently for safe use.

4.4.2. Every public hall, exterior entry door, and stairway in multifamily housing shall be illuminated at all times by ceiling- or wall-type electric lighting fixtures providing 800 lumens for every 200 ft^2 (18.6 m^2) of floor area. The distance between light fixtures shall not be greater than 30 feet (762 cm).

4.4.3. In a building containing one or two dwelling units, every public hall, exterior entry door, and stairway shall be illuminated by ceiling- or wall-type electric lighting fixtures providing 800 lumens for every 200 ft^2 (18.6 m^2) of floor area that is controlled by a three-way switch or a motion-activated device.

Stretch Provisions:

- Polychlorinated-biphenyl (PCB)-containing lighting ballasts (e.g., older pre-1978 T-12 lighting ballasts) shall be removed, replaced with lighting fixtures that do not contain PCBs, and disposed of in accordance with applicable state and federal regulations.
- The lighting fixtures in public halls, stairways, and entries shall provide 1600 lumens for every 200 ft^2 (18.6 m^2) of floor area.
- The parking areas and walkways of multifamily housing shall be illuminated by outdoor lighting devices suitable for the premises.

5. THERMAL COMFORT, VENTILATION, AND ENERGY EFFICIENCY

5.1. Heating, Ventilation, and Air Conditioning Systems.

Facilities for heating, cooling, ventilation, and humidity control shall be maintained in good working condition and operated when necessary for the health and comfort of the occupants and in accordance with the design capacity of the installed equipment. Within 48 hours after equipment has become inoperative due to a mechanical problem or power failure other than a utility outage, an alternative safe source of necessary heating, ventilating, or cooling shall be provided.

5.2. Heating System.

Except in Climate Zone 1, every dwelling shall have a properly installed heating system in good and safe working condition that is capable of safely and adequately heating all habitable rooms, bathrooms, and toilet rooms. The heating system, filtration components, distribution components, heating elements, and cooling elements (if provided), shall be sealed, cleaned, maintained, and operated in accordance with manufacturer specifications and shall be inspected and serviced annually by a licensed heating, ventilation, and air conditioning systems contractor.

5.2.1. Venting and Air Supply for Heating Equipment. Furnaces, water heaters, wood stoves, and other devices that employ combustion-burning fuel shall be vented to the outside of the structure in an approved manner that meets manufacturer specifications and is in compliance with applicable codes and standards (e.g., ANSI 223.1/NFPA 54 National Fuel Gas Code, NFPA 31 Standard for the Installation of Oil-Burning Equipment, NFPA 211 Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances) and shall be supplied with sufficient air to support the continuous complete combustion of fuel and prevent backdrafting.

5.2.2. Minimum Heat Temperature. The heating system shall be capable of maintaining a minimum room temperature of 68° F (20° C) in every habitable room, bathroom, and toilet room.

5.2.3. Heating Supply. If the dwelling unit is rented, leased, or let on terms either expressed or implied that heat will be supplied, heat shall be provided to maintain a minimum temperature of 68° F (20° C) in habitable rooms, bathrooms, and toilet rooms; and at no time during the heating season shall the system allow the temperature to exceed 78° F (25° C) in any room.

5.2.4. Forced-Air Systems. Any dwelling with a forced-air system shall have at least one thermostat within each dwelling unit capable of controlling the heating system, and cooling system if provided, to maintain temperature set point between 55° F (13° C) and 85° F (29° C) at different times of the day. The system shall have a clean air filter installed in accordance with manufacturer specifications at each change in tenancy and at least annually. This filter shall have a minimum efficiency reporting value of eight (MERV-8) unless the system is not equipped to use a MERV-8 filter.

5.2.5. Steam and Hot Water Systems. In dwellings with heating equipment utilizing steam or hot water with a temperature of 110° F (43° C) or greater, protective covers/barriers shall be installed on and maintained for exposed surfaces of baseboard units, radiators, and piping between radiators.

5.2.6. Wood Stoves. A wood stove manufactured after June, 1988 shall have a manufacturer's label certifying compliance with the emission standard at 40 C.F.R. § 60 part AAA. Clearance of 30 inches (76 cm) shall be maintained between combustible materials and a stove with no heat shield. Where a heat shield is present, the clearance between combustible materials and the stove shall be compliant with manufacturer specification for the heat shield.

Stretch Provisions:

- Any new combustion heating equipment installed in occupied or conditioned spaces shall be power-vented or sealed (direct-vented) combustion equipment.
- The heating system shall be controlled by a programmable thermostat to avoid temperature extremes.

- The dwelling shall have provisions to maintain the indoor temperature below a maximum of 85° F (29° C) through the use of mechanical air conditioning, ventilation systems, or passive design features.
- Air filters shall be replaced at least every three months.

5.3. Ventilation.

Natural or mechanical ventilation, or a combination of the two, shall deliver fresh air to every habitable room and bathroom and be capable of removing moisture-laden air and other contaminants generated during cooking, bathing, and showering.

5.3.1. Every dwelling shall have a ventilation system compliant with ASHRAE Standard 62.2 (Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings) or ASHRAE 62.1 (Ventilation for Acceptable Indoor Air Quality) as applicable to the dwelling.

5.3.2. The air exhausted from a bathroom, toilet room, kitchen, clothes dryer, or basement shall not be vented into any other parts of the building's habitable space or an attic; such air shall discharge directly to the outdoors but not near any intake on the building exterior.

5.3.2.1. The exhaust vent from a clothes dryer shall consist of a rigid or corrugated semi-rigid metal duct.

5.3.3. Pipes, ducts, conductors, fans, and blowers shall not discharge gases, steam, vapor, hot air, grease, smoke, odors, or other gaseous or particulate wastes directly upon abutting or adjacent public or private property or that of another occupant. Vent pipe openings and any pest-proofing screens that cover them shall be maintained free of debris.

5.3.4. Basement air shall not be used as supply air for an air handling system.

Stretch Provision:

- HVAC equipment shall have the capacity to maintain indoor relative humidity (RH) at or below 60 percent.

5.4. Air Sealing.

Openings into dwellings and dwelling units shall be sealed to limit uncontrolled air movement.

5.4.1. Exterior doors, windows and skylights, openings where siding and chimneys meet, utility penetrations, electrical outlets, and other openings shall be weathertight.

5.4.1.1. Pads, door sweeps, weather stripping, and seals shall be used and maintained to minimize air leaks.

5.4.2. Openings separating an attached garage from a habitable room, including doors, ceilings, floors, and utility and ductwork penetrations, shall be sealed.

5.4.2.1. Any doorway between a habitable room and a garage shall be equipped with a wood door not less than 1⅜ inches (35 mm) in thickness, a solid or honeycomb core steel door not less than 1⅜ inches (35 mm) thick, or a 20-minute fire-rated door. The door shall have an automatic closing mechanism and be sealed with weather stripping.

5.4.2.2. There shall be no door, window, or other opening from a garage into a room used for sleeping purposes.

5.4.3. Heating and air conditioning system ductwork and air handling units located in an attached garage shall be correctly insulated and sealed.

5.4.3.1. There shall be no supply or return vent openings in a garage that connect to air handlers serving habitable spaces.

5.4.4. In a multifamily building, walls, ceilings, and floors that separate a dwelling unit from neighboring units, corridors, chases, stairwells, and other openings shall be sealed.

Stretch Provision:

- Air handling equipment and associated ductwork shall be relocated from a garage to an area within the conditioned space.

6. MOISTURE CONTROL, SOLID WASTE, AND PEST MANAGEMENT

6.1. Moisture Prevention and Control.

Every foundation, roof, roofing component, exterior wall, door, skylight, and window shall be watertight, weathertight, free of persistent dampness or moisture, and in good condition.

6.1.1. The building's drainage system, such as footing or foundation drains, gutters, downspouts, rainwater collection containers, or other elements, shall direct water away from the structure.

6.1.2. Exterior wood surfaces shall be protected from the elements and decay by paint or other protective treatment. Weep holes in brickwork shall be left open.

6.1.3. Premises shall be graded and maintained to prevent the erosion of soil and to prevent the accumulation of water on the premises, within a crawlspace, or within the structure.

6.1.4. Interior and exterior surfaces and surface coverings, such as but not limited to carpet, wood, cellulose insulation, and paper, paint, and other wall coverings, including paper-faced gypsum board, shall have no signs of visible mold growth or chronic or persistent excessive dampness or moisture.

6.1.5. Building material that is discolored or deteriorated by mold or mildew or causes a moldy or earthy odor shall be cleaned, dried, and repaired. Structurally unsound material shall be removed and replaced.

6.1.5.1. Removal and repair of moldy material shall be conducted in accordance with New York City's *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*, the Institute of Inspection, Cleaning, and Restoration Certification's *IICRC S520 Standard and Reference Guide for Professional Mold Remediation*, or the EPA guidelines for *Mold Remediation in Schools and Commercial Buildings*.

6.1.6. The underlying cause of excessive dampness or moisture, or moldy or earthy odor shall be investigated and corrected.

6.1.7. Cold HVAC and plumbing components and systems (e.g., chilled-water pipes and valves, refrigerant piping, and valves) in readily accessible locations shall be sufficiently and continuously insulated to keep the temperature of their surfaces at least 10° F (4° C) above the dew point of the surrounding air.

6.1.8. Unless the crawl space is sealed and insulated from the outdoors, the crawl space shall be free of high-moisture conditions or be separated from the dwelling by an air seal or other method suitable to the climate and conditions.

Stretch Provisions:

- Exterior weather-resistant barrier systems shall be used to reduce potential for water leaks and moisture intrusion.
- Water/mold-resistant materials shall be used on bathroom walls and floors, showers, and other areas of the home that are likely to be exposed to moisture.
- In warm-humid and mixed-humid climates:
  - Exterior wall insulations shall not include a vapor barrier/retarder material on the interior side (such as plastic sheeting or foil facing), with the exception of closed-cell foam insulation (spray or rigid), kraft-faced insulation, and seasonally adjusting membranes.
  - There shall be no vinyl wallpaper or other impermeable interior finish on the interior surface of exterior walls within an air-conditioned dwelling.
  - Exterior drainable rigid insulation systems shall be used to reduce wall assembly condensation risk.
- The building and its systems shall meet the following moisture management criteria:
  - When the building is being mechanically cooled, ventilation air shall be dried to a dew point value below the building's dew point.
  - Condensation inside HVAC components and air distribution ductwork shall be drained to an appropriate sanitary drain or condensate collection system.

- Indoor surfaces of both occupied and unoccupied spaces shall not be cooled to temperatures so low as to create an average surface relative humidity (RH) of over 80 percent that lasts for more than 30 days on visible surfaces in occupied spaces and surfaces inside building cavities and unconditioned space.
- Indoor dew point shall be low enough to ensure no condensation occurs on the exposed surfaces of cool HVAC components or on building materials or furnishings.
- Humidifiers shall be sized, installed, and controlled so they do not overload the air with humidity, which increases the risk of condensation inside air distribution systems and exterior walls and roofing assemblies.

6.2. Solid Waste.

Every dwelling shall have adequate facilities for temporary storage of trash and recyclable materials.

6.2.1. There shall be trash containers outside the dwelling for the storage of trash awaiting collection or disposal. The total capacity of these facilities shall be sufficient to store occupants' trash between scheduled collection times, and shall be placed on a cleanable surface constructed to minimize spillage.

6.2.2. There shall be containers outside the dwelling for recyclable materials awaiting collection, with capacity sufficient to store occupants' recyclable materials between scheduled collection times.

Stretch Provision:

- Exterior trash and recycling containers shall be placed at least 30 feet (nine meters) from the building, unless such space is not available.

6.3. Pest Management.

Integrated pest management (IPM) methods shall be used to maintain every dwelling free of infestation, openings that allow pest entry, conditions that harbor pests or provide them with food or water, and visible pest residue or debris.

6.3.1. A pest management professional who has an IPM certification or a person trained in IPM shall develop the IPM program for a multifamily building.

6.3.2. Every dwelling, premise, accessory structure, and fence shall be maintained in good repair, free of pest infestation, and inspected for pests and building conditions that attract and support pests.

6.3.2.1. There shall be no accumulation of trash, paper, boxes, lumber, scrap metal, food, or other materials that support rodent harborage in or about any dwelling or premises. Stored materials shall be placed in boxes or stacked in stable piles elevated at least six inches (152 mm) above the ground or floor and at least six inches (152 mm) from the walls. Stored materials shall not block any egress routes.

6.3.2.2. There shall be no trees, shrubs, or other plantings in the soil within six inches (152 mm) of any dwelling.

6.3.2.3. There shall be no accumulation of water in or about any dwelling or premises.

6.3.3. Every openable window and storm door shall be supplied with adequate screens to prevent the entry of pests.

6.3.4. There shall be no holes or open joints in exterior walls, foundations, slabs, floors, or roofs that equal or exceed one-eighth inch (3 mm).

6.3.4.1. The areas surrounding windows, doors, pipes, drains, wires, conduits, vents, and other openings that penetrate exterior walls shall be sealed with low-VOC caulk or closed-cell insulation.

6.3.5. Pest infestation and the underlying cause shall be eliminated using control methods consistent with IPM, such as exclusion, sanitation, and least-risk pesticides scaled to and designed for the targeted infestation.

6.3.5.1. Foggers and organic phosphates shall not be used to control or eliminate pests.

7. CHEMICAL AND RADIOLOGICAL AGENTS

7.1. General Requirements.

All chemical and radiological agents in dwellings, premises, and accessory structures, including but not limited to deteriorated lead-based paint, friable asbestos-containing material, formaldehyde, volatile organic compounds, radon, pesticides, and methamphetamine, shall be contained, stored, removed, or mitigated in a safe and healthy manner consistent with federal, state, and local laws and regulations. When an applicable regulatory limit is more protective than the level included in this section, the more restrictive limit shall apply.

7.2. Lead-Based Paint.

7.2.1. Lead levels at or above federal regulatory limits pursuant to 40 C.F.R. § 745.65 are deemed hazardous: (1) lead-based paint on an existing painted surface—0.5 percent by weight or 1.0 milligrams per square centimeter; (2) dust on floors—40 micrograms of lead per square foot of settled dust (µg/ft^2); (3) dust on interior window sills—250 µg/ft^2; (4) dust on window troughs (wells)—400 µg/ft^2; (5) bare soil in children's play areas—400 parts per million (ppm) of lead; and (6) bare soil in areas of the yard that are not children's play areas—1,200 ppm.

7.2.2. Painted surfaces shall be maintained intact. With the exception of paint that is tested and found not to contain lead-based paint in accordance with 40 C.F.R. § 745.82(a), deteriorated paint at a property built before 1978 shall be repaired in accordance with the renovation requirements of 40 C.F.R. § 745 Subpart E, and the underlying cause of the deterioration shall be corrected.

7.2.3. All renovation, repair, and painting work that disturbs a painted surface in a pre-1978 dwelling shall be performed in accordance with the renovation requirements of 40 C.F.R. § 745, Subpart E, unless the paint has been tested and found not to contain lead-based paint in accordance with 40 C.F.R. § 745.82(a). Dust clearance testing shall be performed at the conclusion of renovation work.

7.2.4. With the exception of paint that is tested and found not to contain lead-based paint in accordance with 40 C.F.R. § 745.82(a), a painted surface shall not be disturbed using methods that involve (1) open-flame burning or torching or operating a heat gun at temperatures above a maximum of 1,100° F (593° C); or (2) power sanding, grinding, power planing, needle gun, abrasive blasting, or sandblasting unless such machines have shrouds or containment systems and a High-Efficiency Particulate Air (HEPA) vacuum attachment that collects dust and debris at the point of generation. The shroud or containment system shall release no visible dust or air outside the shroud or containment system.

7.2.5. Lead-based paint shall not be applied to the interior or exterior surface of any dwelling or dwelling unit.

Stretch Provision:

- Lead present at or above the following limits is deemed hazardous: (1) lead-based paint on a friction, impact, or chewable surface, damaged or otherwise deteriorated, or non-intact—0.06 percent by weight; (2) dust on floors—10 micrograms of lead per square foot of settled dust (µg/ft^2); (3) dust on interior window sills—100 µg/ft^2; and (4) 40 µg/ft^2 on porches.

7.3. Asbestos.

Every owner shall maintain in good repair all asbestos-containing material on the premises. All asbestos-containing material shall be maintained non-friable and free from any defects such as holes, cracks, tears, and/or looseness that may allow the release of fibers into the environment.

7.3.1. Friable asbestos-containing material shall be abated by licensed asbestos professionals in accordance with federal, state, or local requirements.

7.3.2. Any renovation, demolition, or other activity that will disturb asbestos-containing materials shall be preceded by asbestos abatement performed by certified asbestos professionals in accordance with federal, state, or local requirements.

7.3.3. Abatement, removal, and disposal of all asbestos-containing material shall comply with all appropriate federal, state, and local requirements.

7.4. Toxic Substances in Manufactured Building Materials.

7.4.1. Building materials consisting of hardwood plywood, medium-density fiberboard, and particleboard as defined by 15 U.S.C. 2697(b)(2) shall not be used in maintenance and renovations within dwellings, unless the materials have been certified to meet the formaldehyde emission standards of 15 U.S.C. 2697(b)(2):

(1) Hardwood plywood with a veneer core, 0.05 parts per million (ppm);

(2) Hardwood plywood with a composite core, 0.05 ppm;

(3) Medium-density fiberboard, 0.09 ppm;

(4) Thin medium-density fiberboard, 0.11 ppm; and

(5) Particleboard, 0.08 ppm.

7.4.2. Building materials used in maintenance and renovations, including but not limited to paints, coatings, primers, glues, resins, adhesives, and floor coverings, shall be certified as having no volatile organic chemicals (VOCs) or low VOC emissions, and having no halogenated flame retardants (HFRs).

7.5. Radon.

Radon present at levels at or above the EPA action level of four picocuries radon per liter of air (pCi/L) in the lowest habitable level of the dwelling shall be deemed hazardous. Radon levels shall be determined by an approved testing method in accordance with state and local requirements. Radon levels exceeding four pCi/L shall be mitigated by a qualified radon mitigation professional who meets state and local requirements. If there are no state or local requirements qualifying radon testing and mitigation professionals, radon testing and mitigation shall be performed by a professional certified by a national private-sector radon proficiency program.

Stretch Provision:

- Radon present at levels at or above two pCi/L in the lowest habitable level of the dwelling shall be deemed hazardous. Radon determined by an approved testing method to exceed two pCi/L shall be mitigated by qualified radon mitigation professionals in accordance with state and local requirements. If there are no state or local requirements qualifying radon testing and mitigation professionals, radon testing and mitigation shall be performed by a professional certified by a national private-sector radon proficiency program.

7.6. Pesticides.

Pesticides shall only be used in accordance with IPM methods discussed in Section 6.3, using the least toxic pesticide with demonstrated efficacy for the identified pest.

7.6.1. Pesticides shall be applied only in areas and at concentrations which comply with manufacturer specifications. When it is determined by an approved method that a hazardous amount of a pesticide has been applied in a location or at a concentration contrary to manufacturer specifications, the hazard shall be immediately mitigated.

7.6.2. Pesticides shall be stored and disposed in accordance with manufacturer specifications.

7.7. Methamphetamine.

A dwelling that has been used for methamphetamine manufacture shall be vacated until certified by an approved testing method as safe from hazardous materials related to the methamphetamine manufacturing process.

7.8. Smoke in Multifamily Housing.

7.8.1. Smoking shall be prohibited in all indoor common areas of multifamily buildings.

7.8.2. Smoking shall be prohibited in exterior areas less than 25 feet (762 cm) from building entrances, outdoor air intakes, and operable windows.

7.8.3. Tenants and prospective tenants shall be informed in writing of any applicable smoke-free policy and the location of designated smoke-free and smoking areas. Signs shall be posted in all designated areas.

7.8.4. Tenants who terminate a lease early due to incursion of tobacco smoke or the inception of a smoke-free policy shall be exempt from early termination penalties or security deposit forfeiture.

Stretch Provisions:

- A property-wide policy shall be established in consultation with current tenants to designate exterior common areas where smoking shall be prohibited and areas where smoking shall be permitted.
- A property-wide policy shall be established in consultation with current tenants to designate dwelling units where tobacco smoking shall be prohibited.

Definitions

Accessory structure shall mean a detached structure, such as garage or shed, that is subordinate to the principal building(s) on the same premises.

Adequate shall mean sufficient to accomplish the purpose intended without unreasonable risk to human health or safety.

Approved shall mean established by the local or state authority having such administrative authority or determined by the designated official.

Asbestos shall mean chrysotile, amosite, crocidolite; or, in fibrous form, tremolite asbestos, anthophyllite asbestos, or actinolite asbestos.

Asbestos-containing material shall mean any material or product containing more than one percent asbestos.

Backdrafting shall mean improper venting of combustion appliances that causes combustion by-products or other gases to enter the indoor environment rather than to exhaust outdoors.

Balusters shall mean pillars or columns in a series supporting a rail or guard.

Basement shall mean a portion of a building located partly or entirely below grade.

Biological agent shall mean but not be limited to mold, infestation, human and animal waste, wastewater, sewage, rotting material, and accumulation of trash that may harbor viruses, parasites, fungi, and/or bacteria.

Bulk storage container shall mean a metal trash container that is more than 40 inches (102 cm) in height, has a capacity of more than two cubic yards (1.5 m^3), and is equipped with fittings for hydraulic and/or mechanical emptying, unloading, and/or removal.

Carbon monoxide alarm shall mean an electronic device that measures the level of carbon monoxide gas in the air and is equipped with a sensor that activates an audible alarm when an amount of carbon monoxide above the device's threshold level accumulates in the area in which the alarm is located.

Chemical agent shall mean chemicals that have the potential to cause adverse health effects.

Chimney shall mean a vertical masonry shaft of reinforced concrete or other approved noncombustible, heat-resisting material enclosing one or more flues, to remove products of combustion from solid, liquid, or gaseous fuel.

Class ABC fire extinguisher shall mean a fire extinguisher capable of putting out (1) fires in ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics (Class A); (2) fires in flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammable gases (Class B); and (3) fires that involve energized electrical equipment (Class C).

Cleanable shall mean moisture-resistant, free from cracks, pitting, chips, or tears, and designed to be cleaned frequently.

Climate Zone 1 shall mean the geographic region designated by the International Energy Conservation Code that receives each year at least 5,000 cooling degree days, which are calculated by multiplying temperature differences above 50 degrees Fahrenheit by the amount of time such higher temperatures are reached.

Common areas shall mean areas within multifamily housing that are designated for use by all occupants, owners, tenants, or users of a building or building complex, including but not limited to corridors, hallways, lobbies, parking areas, laundry rooms, recreational spaces, pools, and exterior property.

Dwelling shall mean any building wholly or partly used or intended to be used for living, sleeping, cooking, and eating.

Dwelling unit shall mean a room or group of rooms used or intended to be used for living, sleeping, cooking, and eating by one or more individuals living together as a single household.

Egress shall mean the path available for a person to leave a building. This route shall be unobstructed, and doors along this route cannot be subject to locking from the side to which people will be leaving.

Electrical system shall mean a system that makes electricity available in a building and distributes it through outlets and lighting fixtures for occupant use.

Emergency escape and rescue opening shall mean an operable window, door, or other similar device that provides for a means of escape and access for rescue in the event of an emergency.

Flue shall mean a conduit made of non-combustible heat-resisting material that is used to remove the products of combustion from solid, liquid, or gaseous fuel.

Formaldehyde shall mean the colorless, flammable carcinogenic chemical, an organic compound with the formula HCHO, which is used in the manufacture of building materials (e.g., pressed wood products) and household products. Federal limits for formaldehyde emissions from building materials (hardwood plywood, medium-density fiberboard, and particleboard) were established in 15 U.S.C. 2697(b) (2).

Friable shall mean asbestos-containing material that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Grade shall mean the finished ground level adjoining building at all exterior walls.

Graywater system shall mean a system for collecting household waste water from plumbing fixtures other than toilets and treating it for non-potable reuse.

Guard shall mean a building component or a system of building components located near the open sides of elevated walking surfaces or adjacent to a window that minimizes the possibility of a fall from the walking surface or window to the lower level.

Habitable room shall mean an enclosed floor space used or intended to be used for living, sleeping, cooking, or eating, and excluding bathrooms, toilet rooms, laundries, furnace rooms, pantries, kitchenettes, utility rooms, foyers, communicating corridors, stairways, closets, storage spaces, workshops, or rooms with less than 70 ft^2 (6.5 m^2) of floor space.

Handrail shall mean a horizontal or sloping rail intended for grasping by the hand for guidance or support.

Harborage shall mean any conditions or place where pests can obtain water or food, nest, or obtain shelter.

Healthy: See "safe and healthy."

Heating system shall mean facilities that, for the purpose of maintaining thermal comfort during cold weather, heat air or water through a furnace or heat pump and distribute such heat through vents, ducts, pipes, or radiators, or hardwired electrical heaters. Neither a cooking appliance nor a portable, unvented fuel-burning space heater is a heating system.

Infestation shall mean the recurrent presence of any life stages of a pest that presents a hazard to humans, property, or the environment.

Insects shall mean all species of classes of Arachnida and Insecta (Hexapoda) of the phylum Arthropoda and includes but is not limited to flies, mosquitoes, bed bugs, crickets, cockroaches, moths, bees, wasps, hornets, fleas, lice, beetles, weevils, gnats, ants, termites, mites, ticks, spiders, and scorpions.

Integrated pest management shall mean a systematic strategy for managing pests that consists of prevention, exclusion, monitoring, and suppression of pests. Where chemical pesticides are necessary, a preference is given to materials and methods that maximize safety and reduce environmental health risk. Methods to manage pests include eliminating their harborage places; removing or making inaccessible their food and water sources; routine inspection and monitoring; identification of evidence found; treatment that is scaled to and designed for the infestation; using the least-toxic pesticide for the identified pest; and follow-up inspection until the infestation is gone. Low-toxicity pesticide products are labeled with the signal word of CAUTION while WARNING, DANGER, and POISON indicate higher levels of toxins.

L_{dn} (day-night equivalent sound level) shall mean a weighted average sound level measured over a 24-hour period with adjustments anticipating reduced levels during evening and night hours to factor occupants' extra sensitivity to noise during those time periods.

LA_{eq} shall mean an average sound level measured over a specified period.

Lead-based paint shall mean equal to or greater than 1.0 milligram lead per square centimeter or 0.5 percent lead by weight for existing surfaces, paint, or other surface coatings, and equal to or greater than 90 parts per million (ppm) or .009 percent lead for paint and other surface coatings at the point of purchase.

Lead-based paint hazard shall mean any deteriorated lead-based paint, dust-lead hazard, soil-lead hazard, lead-based paint present on chewable surfaces with teeth marks, or lead-based paint present on friction surfaces, in accordance with 40 C.F.R.§ 745.65.

Let shall mean to lease or grant the use and possession of real property whether or not for compensation.

Long-lasting battery shall mean a battery having a life of ten or more years.

Methamphetamine shall mean the synthetic drug with more rapid and lasting effects than amphetamine, sometimes used or manufactured illegally as a stimulant.

Mixed-humid climate shall mean a region that receives more than 20 inches (50 cm) of annual precipitation, has approximately 5,400 heating degree days (65° F or 18° C basis) or fewer, and where the average monthly outdoor temperature drops below 45° F (7° C) during the winter months. The U.S. counties located in a warm-humid climate are identified by Building America.

Mold shall mean a growth that a fungus produces on damp or decaying organic matter or on living organisms.

Multifamily housing shall mean any dwelling containing more than two dwelling units.

Occupant shall mean any individual living, sleeping, cooking, or eating in and having possession of a dwelling or dwelling unit.

Owner shall mean any person who alone, jointly, or severally with others, has legal title to the premises, dwelling, or dwelling unit, with or without accompanying actual possession thereof; has charge, care, or control of any premises, dwelling, or dwelling unit, as owner, agent of the owner, or other person; is executor, administrator, trustee, or guardian of the estate of the owner; is a mortgagee in possession; or is the senior officer or trustee of the association of unit owners of a condominium.

Person shall mean any individual, firm, corporation and its officers, association, partnership, cooperative, trustee, executor of an estate, governmental agency, or any other legal entity recognized by law.

Pesticide shall mean any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant, or desiccant.

Pests shall mean insects, rodents, or other vermin.

Plumbing shall mean and include any and all of the following facilities and equipment: water pipes, garbage disposal units, waste pipes, toilets, sinks, bathtubs, shower baths, catch basins, drains, vents, installed clothes washing machines and dishwashers, and any other supplied plumbing fixtures, together with all connections to water, sewer, or gas lines.

Potable water shall mean water that complies with the maximum contaminant limits of the United States Environmental Protection Agency (EPA) or a regulatory limit that is more protective than EPA's.

Premises shall mean a lot or parcel of land or plot of land, either occupied or unoccupied by any dwelling, and includes any such building, accessory structure, or other structure thereon.

Privacy shall mean the existence of conditions that permit an individual or individuals to be without observation, interruption, or interference by unwanted individuals.

Properly connected shall mean installed in accordance with all applicable codes and ordinances, and in good working order and not constituting a hazard to life or health.

Radon shall mean the odorless, tasteless, and invisible gas found in both outdoor air and indoor air that is a form of ionizing radiation produced by the decay of uranium in soil and water.

Recyclable materials shall mean disposable products composed of glass, metal, paper, plastic, and similar content that can be processed to produce a new supply of the same material or be reused in the production of other materials.

Riser shall mean the vertical surface that connects one tread of a step or stair to the next.

Rodent shall mean any member of the order Rodentia, including but not limited to field and wood mice, wood rats, squirrels, woodchucks, gophers, Norway rats *(Rattus norvegicus)*, roof rats *(Rattus rattus)*, and house mice *(Mus musculus)*.

Safe and healthy shall mean the condition of being free from danger and chemical, biological, and physical agents that may cause injury, disease, or death; and fit for human occupancy.

Smoke shall mean emissions from a lighted pipe, cigar, cigarette, hookah, weed, herbs, or any other lighted biomass-burning substances such as but not limited to tobacco, marijuana, and incense.

Smoke detector shall mean a device that is equipped to activate an audible alarm when it detects the presence of combustion products in air.

Space heater shall mean a self-contained convection or radiant heater designed to heat a room, two adjoining rooms, or some other limited space or area.

Supplied shall mean paid for, furnished by, provided by, or under the control of the owner or operator.

Toilet room shall mean a room containing a water closet or urinal but not necessarily a bathtub or shower.

Trash shall mean garbage, refuse, or ashes.

Trash container shall mean a container with a tight-fitting lid that is constructed of metal or other durable material that is impervious to rodents, insects, and handling stress; and is capable of being filled, emptied, and cleaned without creating unsanitary conditions.

Tread shall mean the horizontal surface of a step or stair.

Unblockable drain shall mean a pool, spa, or whirlpool drain of any size and shape that a human body cannot sufficiently block to create a suction entrapment hazard.

Ventilation system shall mean the natural or mechanical process of supplying or removing conditioned or unconditioned air to or from a space.

Volatile organic compounds, or VOCs, shall mean organic chemical compounds whose composition makes it possible for them to evaporate under normal indoor atmospheric conditions of temperature and pressure.

Walk-off mat shall mean a coarse-ribbed or plush-surfaced mat with nonslip backing placed inside or just outside building entrances designed to capture dirt, water, and other materials tracked inside by people and equipment.

Warm-humid climate shall mean the region where either of the following conditions occurs: (1) 67° F (19.4° C) or higher wet bulb temperature for 3,000 or more hours during the warmest six consecutive months of the year; or (2) 73° F (22.8° C) or higher wet bulb temperature for 1,500 or more hours during the warmest six consecutive months of the year. The U.S. counties located in a warm-humid climate are identified in Figure 301.1 and Table 301.1 of the 2012 International Energy Conservation Code.

Waterproof shall mean impervious to water.

Watertight shall mean closely sealed, fastened, or fitted so that no water enters or passes through the surface.

Weathertight shall mean secure against penetration by air, wind, rain, snow, and other weather conditions.

Interpretation of Terms:
Where the words "dwelling," "dwelling unit," "premises," and "structure," or a particular building component are used in this Standard, they shall be construed as if they were followed by the words "or any part thereof." Words used in the singular include the plural, and the plural the singular.

Annotated Standard:
Requirements and Stretch Provisions with Rationales, References, and Resources

1. DUTIES OF OWNERS AND OCCUPANTS

1.1. Duties of Owners.

The owner has the duty to ensure that the structure, dwelling, dwelling unit, common areas, and premises are maintained in a safe and healthy condition, in compliance with this Standard and other applicable requirements.

1.1.1. The owner shall ensure the collection of trash and recyclables and provide and maintain trash containers, bulk storage containers, recycling containers, and areas where the containers are stored.

1.1.2. The owner shall maintain the building and premises to keep pests from entering the building and dwelling units, inspect and monitor for pests, and eliminate pest infestation in accordance with integrated pest management methods.

1.1.3. The owner shall provide occupants with at least 48 hours written notice of the planned use of a chemical agent such as a pesticide or herbicide, the date and location of application, and a copy of the warning label.

1.1.4. The owner shall not cause or allow any water, sewage, electrical, or gas service, facility, or equipment required for safe and healthy occupancy to be removed, shut off, or discontinued for any occupied dwelling, except for such temporary interruption as may be necessary while repairs or alterations are being performed, or during temporary emergencies requiring discontinuance of service. This provision does not apply where the occupant has contractual control over the service and shall not be interpreted as preventing a utility company from discontinuing service for reasons allowed by law.

1.1.5. The owner shall investigate occupant reports of unsafe or unhealthy conditions, respond in writing, and make needed repairs in a timely manner.

1.2. Duties of Occupants.

The occupant shall properly use and operate the dwelling unit and owner-supplied fixtures and facilities controlled by the occupant in order to maintain a safe and healthy environment within the dwelling unit, and report unsafe or unhealthy conditions, including breakdowns, leaks, and other problems requiring repair to the owner in a timely manner.

1.2.1. The occupant shall place trash and recyclables in the appropriate containers.

1.2.2. The occupant shall work with the owner to ensure pest-free conditions in accordance with integrated pest management.

1.2.3. If the occupant's action leads to pooling of water or another excessive moisture problem inside the dwelling unit, the occupant shall clean up and dry out the area in a timely manner.

2. STRUCTURE, FACILITIES, PLUMBING, AND SPACE REQUIREMENTS

2.1. Structure.

Requirement:
Every foundation, roof, floor, exterior and interior wall, ceiling, inside and outside stair, porch, trim, accessory structure, fence, door, window, and window glass shall be safe to use and capable of supporting the intended design loads and load effects and shall be in good condition.

Rationale:
The structure of a dwelling is complex. Its different parts must all be adequately designed and properly maintained to ensure that the habitable space is safe and healthy. The structure of a dwelling is dependent on foundation and footing, vapor barriers, house framing, roof framing, roofs, exterior walls, and trim components that are maintained in good condition. Poor construction of the structure can result in several negative consequences, including dampness or condensation; poor energy efficiency; excessive noise; structural damage, such as cracks in walls, open joints, and loose roofs, which allows pest intrusion; and collapse of building components, such as fixtures, flooring, lighting and cabinets, which can lead to poor health, injuries, or even death. Structural deficiencies in a dwelling can cause falls, fires, burns and scalds, carbon monoxide and other poisoning, drowning, and other injuries.

References:

- Jacobs, D. E. & Baeder, A. (2009). *Housing interventions and health: A review of the evidence*. Columbia, MD: National Center for Healthy Housing. Retrieved from http://www.nchh.org/LinkClick.aspx?fileticket=2lvaEDNBIdU%3d&tabid=229
- U.S. Centers for Disease Control and Prevention and U.S. Department of Housing and Urban Development. (2006). *Healthy housing reference manual*. Retrieved from www.cdc.gov/nceh/publications/books/housing/housing.htm
- U.S. Department of Housing and Urban Development—Office of Healthy Homes and Lead Hazard Control. (2010). *Healthy home rating system—Operating guidance*. Retrieved from http://portal.hud.gov/hudportal/documents/huddoc?id=operating_guidance_hhrs_v1.pdf

2.2. Facilities.

Requirement:
Every plumbing fixture and pipe, chimney, flue, smoke pipe, and every other facility, piece of equipment, or utility shall be installed in conformance with applicable statutes, ordinances, and regulations.

2.2.1. Mechanical, utility, and heating equipment shall be separated from habitable rooms. In multifamily buildings, equipment rooms shall be locked.

Rationale:
Housing facilities in disrepair are likely to cause health burdens as a result of plumbing leaks and chimney, flue, and smoke pipe malfunctions. Chimneys in poor condition can cause condensation buildup within the chimney, which can lead to deterioration and eventually chimney collapse. Additionally, carbon monoxide and other combustion-related hazards that leak through gaps and cracks can cause lasting damage to a resident's health. Fire outbreaks can also start in chimneys and lead to serious injuries or death.

References:

Chimney Safety Institute of America. (2013). Safe home heating—avoiding carbon monoxide hazards. http://www.csia.org/homeowner-resources/Avoiding_Carbon_Monoxide_Hazards.aspx

2.3. Plumbing System.

Requirement:
Every plumbing fixture, stack, vent, water, waste, and sewer pipe shall be properly installed, maintained in a safe and functional order, and kept free from obstructions, leaks, and defects.

2.3.1. An approved potable water supply system shall provide an adequate amount of running water under pressure to all fixtures simultaneously.

2.3.2. An adequate supply of heated running water under pressure shall be supplied to sinks, bathtubs, showers, and laundry facilities. Water heaters shall be set at a minimum temperature of 110° F (43° C). At bathtub faucets and shower heads, the maximum temperature shall be 120° F (49° C). Heated water shall be provided by either a tank-type or tankless water heater. A tank-type water heater shall have a temperature/pressure relief valve that discharges to a drip pan, storage tank, or the outside. The temperature of water discharged from a tankless water heater shall not exceed 140° F (60° C).

2.3.3. Every waste pipe shall be connected to a public sewer system, an approved private sewage disposal system, or the dwelling's graywater system. No toilet waste pipe shall be connected to a graywater system. The drainage system shall have a cleanout.

2.3.4. Faucet discharge points shall be located above the overflow rim of sinks, tubs, or other fixtures that collect water.

Stretch Provisions:

- Bathtub and shower faucets shall have anti-scald devices, such as an automatic temperature control mixing valve, water temperature limiting device, or temperature-actuated flow reduction valve.
- Each dwelling unit in multifamily housing shall have a separate meter for water supplied to the unit.
- Multifamily housing with one or more central water heaters shall comply with ASHRAE Standard188P to assess and manage the risks associated with *Legionella* in building water systems.
- A private water supply shall be tested annually to ensure that water does not have biological or chemical contaminants.
- If there is a suspected risk of excessive lead in drinking water supplied by a public water utility, the water shall be tested. The risk factors shall include, but are not limited to, presence of an occupant with a blood lead level of five micrograms per deciliter or more, pipes made of lead or leaded brass, test results indicating that the lead level in the public water supply exceeds federal limits, and plumbing repair work that has disturbed water supply components (such as faucets, valves, pipes, meters, pressure regulators, backflow preventers, lead-soldered joints, or service lines). If the lead level in the water sample exceeds 15 parts per billion, there shall be an investigation of the possible sources(s) to determine the appropriate course of action. If warranted, lead and brass-containing components shall be replaced.

Rationale:

Plumbing leaks may cause mold growth on building materials. People who are exposed to molds may experience nasal and eye irritation, respiratory and allergic diseases, and asthma exacerbation. Damp conditions may magnify levels of biological agents, such as dust mites, bacteria, and cockroaches. The containment of household sewage is instrumental in protecting the public from waterborne and vector-borne diseases. Water at 140° F (60° C) can result in a second-degree burn after three seconds and a third-degree burn after five seconds. The long-term effects of scalds can include disability, disfigurement, or psychological harm and repeated skin grafts. Exposure to hazards in drinking water must be averted to prevent lead poisoning, *Legionella*, and other diseases caused by waterborne biological and chemical agents.

References:

- American Society of Heating, Refrigerating, and Air-Conditioning Engineers. (2011). *Standard 188P (draft): Prevention of Legionellosis associated with building water systems*. Retrieved from https://osr.ashrae.org/Public%20Review%20Draft%20Standards%20Lib/Std-188P-PPR2%20Final%206%2010%202011.pdf
- Burge, H. A. (1990, November). Bioaerosols: Prevalence and health effects in the indoor environment. *Journal of Allergy and Clinical Immunology, 86*(5), 687-704. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/2229836
- Institute of Medicine. (2004). *Damp indoor spaces and health*. Washington, DC: The National Academies Press. Available at http://www.iom.edu/Reports/2004/Damp-Indoor-Spaces-and-Health.aspx
- International Code Council. (2012). *International plumbing code*, §§ 424.3, 424.5.

- International Code Council. (2012). *International property maintenance code*. §§ 505.4, 504.4-6. 501.6.
- International Code Council. (2012). *International residential code*, §§ P2713, P 2708.3, P 3009.
- U.S. Centers for Disease Control and Prevention. (2013, August). Drinking water. Retrieved from http://www.cdc.gov/healthywater/drinking/index.html
- U.S. Environmental Protection Agency. (2009, May). National primary drinking water regulations. Retrieved from http://water.epa.gov/drink/contaminants/index.cfm
- U.S. Environmental Protection Agency. (2011, April). Problems with pinhole leaks in your copper water pipes. *EPA Science Matters*. Retrieved from http://www.epa.gov/sciencematters/april2011/leaks.htm
- World Health Organization. (2010). *Technical and policy recommendations to reduce health risks due to dampness and mould*. Copenhagen: World Health Organization Regional Office for Europe. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0015/121425/E92998.pdf

Resources:

- American Society of Sanitary Engineering International. (n.d.). www.asse-plumbing.org/standards
- Connecticut Department of Public Health. (2013). *Private drinking water in Connecticut*. Retrieved from http://www.ct.gov/dph/lib/dph/environmental_health/eoha/pdf/24_residential_drinking_water_well_testing.pdf

2.4. Kitchen.

Requirement:
Every dwelling unit shall have a kitchen equipped with the following:

2.4.1. A kitchen sink in good working condition that is properly connected to heated and unheated water supplies and waste pipes. Any provided dishwasher and components of the sink, including disposal and water filtration devices, shall be in good working condition and properly connected.

2.4.2. A counter for food preparation and cabinets and/or shelves sufficient to store occupants' food that does not require refrigeration and eating, drinking, and food preparation equipment. Cabinets shall have tight-fitting doors and no gaps between any surfaces. The counter, countertop edges, cabinets, and shelves shall be of sound construction and furnished with surfaces that are impervious to water, smooth, and cleanable.

2.4.3. A range for cooking food. The range shall be properly installed with all necessary connections for safe and efficient operation and shall be maintained in good working condition.

2.4.3.1. The range shall include an oven unless both a separate oven, other than a microwave oven, and a cooktop are provided. A hot plate is not an acceptable substitute for burners on a range or cooktop. The range or cooktop shall have a vertical clearance of not less than 30 inches (762 mm) from above its surface to unprotected combustible material. Reduced clearances are permitted in accordance with the listing and labeling of the range hood.

2.4.3.2. Ventilation for the range shall be provided in accordance with Subsection 5.3.

2.4.4. A refrigerator with a freezer. The refrigerator shall be in good working condition, of sufficient size to store occupants' food that requires refrigeration, and capable of maintaining a temperature less than 41° F (6° C) but more than 32° F (0° C). The freezer section shall be capable of maintaining a temperature below 0° F (-18° C).

2.4.4.1 If the lease does not provide for a refrigerator, adequate connections for the occupant's installation and operation of a refrigerator shall be provided.

2.4.5. A kitchen floor in good condition with a sealed, water-resistant, nonabsorbent, and cleanable surface.

Stretch Provisions:

- Cabinets and countertops shall be constructed of materials that are rated No-Added Formaldehyde (NAF) or Ultra-Low-Emitting Formaldehyde Resins (ULEF).

- Wall surfaces immediately adjacent to the range, sink, and counter shall be covered with an impervious finish.
- The joints where a wall meets a cabinet or counter, and where a counter meets a stove or sink, shall be sealed or covered to permit thorough cleaning and deter pests.
- Enclosed cabinets (as opposed to a combination of shelves and cabinets) sufficient to store occupants' food that does not require refrigeration shall be provided.
- Freestanding stoves shall have brackets to prevent tip-over.

Rationale:
Properly designed kitchens enable the safe and hygienic preparation and cooking of food and reduce the risk of food poisoning. Damp, unmaintained surfaces may deteriorate, causing increased chance of growth of biological agents, presenting a risk of food contamination and food poisoning. Kitchen floors that are impervious to water and capable of being cleaned and maintained prevent the accumulation of dirt, moisture, and biological agents.

References:

- California Air Resources Board. (n.d.). No-added formaldehyde and ultra low emitting formaldehyde resins. http://www.arb.ca.gov/toxics/compwood/naf_ulef/naf_ulef.htm
- International Code Council. (2012). *International residential code*, § M1901.1.
- U.S. Department of Housing and Urban Development—Office of Healthy Homes and Lead Hazard Control. (2010). *Healthy home rating system—Operating guidance*. Retrieved from http://portal.hud.gov/hudportal/documents/huddoc?id=operating_guidance_hhrs_v1.pdf

2.5. Bathroom.

Requirement:
Every dwelling unit shall have a private bathroom equipped with the following:

2.5.1. A toilet in good working condition that is sealed to the waste pipe and affixed to the floor and properly connected to both the dwelling's water supply and a waste pipe leading to an approved sewage system or private waste disposal system.

2.5.2. A sink in good working condition, with a stable connection to the wall or secure attachment to the floor that is properly connected to the heated and unheated potable water supply and a sealed trap leading to a waste pipe.

2.5.3. A bathtub or shower in good working condition that is properly connected to the heated and unheated potable water supply and a waste pipe. The bottoms of bathtubs and shower floors shall have permanent or removable nonslip surfaces.

2.5.4. Cleanable nonabsorbent water-resistant material on floor surfaces and extending on bathroom walls at least 48 inches (122 cm) above a bathtub and 72 inches (183 cm) above the floor of a shower stall. Such materials on walls and floors shall form a watertight joint with each other and with the bathtub or shower.

2.5.5. Ventilation for the bathroom provided in accordance with Subsection 5.3.

Stretch Provisions:
- Grab bars shall be firmly anchored to the wall adjacent to each bathtub, shower, and toilet in accordance with the Americans with Disabilities Act Design Guidelines.
- Tub and shower enclosures composed of tile or panel assemblies with caulked joints shall be installed over moisture-resistant backing material, such as cement board. Paper-faced wallboard shall not be used behind such tub and shower enclosures. Monolithic tub and shower enclosures (e.g., fiberglass with no seams) are exempt from these limitations unless required by the manufacturer.

Rationale:
Poorly maintained bathrooms can cause water damage, mold growth, and associated health issues. Exposure to bathroom-related biological agents can cause respiratory and gastrointestinal symptoms. People who are exposed

to molds may experience nasal and eye irritation, respiratory and allergic diseases, and asthma exacerbation. Structural deficiencies in the bathroom, such as the lack of grab bars and nonslip surfaces, may lead to falls, especially among young children and older adults. Children under the age of five years are most likely to fall in the bathroom, but older adults experience greater injuries. The most common injuries resulting from falls associated with a bath, shower, or similar facility are cuts or lacerations, swelling or bruising, or fractures. Outcomes from a bathroom fall are likely to be more severe than in other areas, because of the many hard projections and surfaces found in bathrooms and the fact that the user may be unprotected by clothing.

References:

- Cutbill, M. (1982). *Analysis of accidents located in the bathroom.* London, U.K.: Department of Trade and Industry. As cited in U.S. Department of Housing and Urban Development—Office of Healthy Homes and Lead Hazard Control. (2010). *Healthy home rating system—Operating guidance.* Retrieved from http://portal.hud.gov/hudportal/documents/huddoc?id=operating_guidance_hhrs_v1.pdf
- DiGuiseppi, C., Jacobs, D. E., Phelan, K. J., Mickalide, A. D., & Ormandy, D. (2010, September). Housing interventions and control of injury-related structural deficiencies: A review of the evidence. *Journal of Public Health Management Practice,* S32–S41.
- International Code Council. (2012). *International building code,* § 1210.2.
- NYC Mayor's Office for People with Disabilities. (2010, September). *Inclusive design guidelines.* Available at: http://shop.iccsafe.org/inclusive-design-guidelines-new-york-city-1.html
- U.S. Department of Justice. (2010). *Americans with Disabilities Act standards for accessible design.*§ 609. Retrieved from http://www.ada.gov/regs2010/2010ADAStandards/2010ADAstandards.htm#Bars
- World Health Organization. (2010). *Technical and policy recommendations to reduce health risks due to dampness and mould.* Copenhagen: World Health Organization Regional Office for Europe. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0015/121425/E92998.pdf
- World Health Organization. (2009). *WHO guidelines for indoor air quality: Dampness and mould.* Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0017/43325/E92645.pdf

2.6. Minimum Space.

Requirement:
The dwelling shall provide privacy and adequate space for sleeping and living.

2.6.1. A bedroom shall not be the only passageway to the only bathroom in a dwelling unit with more than one bedroom.

2.6.2. A bathroom or toilet room shall not be the only passageway to any habitable room, hall, basement, or the exterior of the dwelling.

2.6.3. Every habitable room shall have a minimum floor area of 70 ft^2 (6.5 m^2).

2.6.4. Every dwelling shall have closet space or other storage space to store occupants' clothing and personal belongings.

2.6.5. The ceiling height of any habitable room shall be at least 84 inches (213 cm). In a habitable room with a sloping ceiling, at least one-half of the floor area shall have a ceiling height of at least 84 inches (213 cm). If any part of a room has a ceiling height lower than 60 inches (152 cm), its floor area shall not be considered when computing the floor area of the room.

2.6.6. A habitable room located partly or totally below grade shall be provided with natural light by windows in accordance with Subsection 4.3, and ventilation in accordance with Subsection 5.3. In such a room, the ceiling and any ducts, pipes, and other obstructions shall be at least 84 inches (213 cm) above the floor throughout the room, and walls and floors shall be waterproof and free of dampness.

Rationale:
Privacy is a necessity to people, to some degree and during some periods. There should be sufficient space to provide for social interaction between members of the household, while allowing for private time away from other household members. Personal space and privacy needs are important for the individual members of the same household as well as for individuals or households sharing rooms and/or facilities. Providing adequate enclosed floor space for living, sleeping, cooking, or eating and storage helps prevent clutter and provides privacy to promote healthy living. Pest harborage, psychological distress, and injury hazards may result from clutter. Where units with rooms meeting the minimum floor area requirement are unavailable or unaffordable, it may be necessary to deviate from minimum room size.

References:

- Housing Corporation and Care Service Improvement Partnership. (2006). *Good housing and good health?* Retrieved from http://www.healthimpactproject.org/resources/document/Good_housing_and_good_health.pdf
- International Code Council. (2012). *International property maintenance code*, §§ 404.4.3, 404.3.
- MidWest Plan Service. (2006). *The house handbook: Guidelines for building or remodeling your home.* Ames, IA: Iowa State University.
- Office of the Deputy Prime Minister. (2004, May). *The impact of overcrowding on health & education: A review of the evidence and literature.* London: Office of the Deputy Prime Minister. Retrieved from http://dera.ioe.ac.uk/5073/
- U.S. Department of Housing and Urban Development—Office of Healthy Homes and Lead Hazard Control. (2010). *Healthy home rating system—Operating guidance.* Retrieved from http://portal.hud.gov/hudportal/documents/huddoc?id=operating_guidance_hhrs_v1.pdf

2.7. Floors and Floor Coverings.

Requirement:
Floors and floor coverings shall be attached at each threshold, maintained in safe and healthy condition, capable of being cleaned, and free of bulges and buckling. Carpets shall have no tears, folds, or bumps.

Stretch Provisions:
- Floor coverings shall consist of low-pile carpet or nonabsorbent material such as hardwood, tile, or resilient flooring. Carpet and other floor coverings shall be certified as having low volatile organic compound (VOC) emissions, and any adhesives, padding, or other materials used in installing the floor covering shall be certified as having no VOCs or low VOC emissions, and having no perfluorocarbons or halogenated flame retardants.
- Walk-off entry mats shall be provided inside or outside each entryway that leads to the outdoors.

Rationale:
Worn carpet that is poorly maintained can pose slip, trip, and fall hazards. Carpet in poor condition may also be a source of chemical and biological agents that become lodged in the carpeting. Worn carpeting is difficult to vacuum adequately. Cleanable floors in good condition are less likely to accumulate dirt, moisture, and chemical and biological agents. Volatile organic compounds (VOCs) contribute significantly to unhealthy indoor air quality. VOC sources are not limited to the flooring itself, but also include glues, padding, and other materials used in installation. Perfluorocarbons (PFCs), which are linked to a range of developmental disorders and other adverse effects, were added to carpets for stain resistance until U.S. manufacturers voluntarily discontinued their use in 2006.

References:

- California Department of Public Health. (2010). *Emission testing method for California specification 01350: Standard method for the testing and evaluation of volatile organic chemical emissions from indoor sources using environmental chamber.* Retrieved from http://standards.nsf.org/apps/group_public/download.php/19152/CDPH%20 01350%20V1-1.pdf
- Carpet and Rug Institute. (n.d.). Residential: Green label/green label plus. Retrieved from http://www.carpet-rug.org/residentialcustomers/selecting-the-right-carpet-or-rug/green-label.cfm

- Environmental Working Group. (2003). PFCs last forever. Retrieved from http://www.ewg.org/research/pfcs-global-contaminants/pfcs-last-forever
- Lewis, R. D., Breysse, P. N., Lees, P. S. J., Diener-West, M., Hamilton, R. G., & Eggleston, P. (1998, September). Factors affecting the retention of dust mite allergen on carpet. *American Industrial Hygiene Association Journal, 59*(9), 606–613. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9778820
- National Center for Healthy Housing. (2008). *Carpets and healthy homes.* Retrieved from http://www.nchh.org/Portals/0/Contents/CarpetsHealthyHomes.pdf
- Scientific Certification System. (n.d.). *FloorScore®*. Retrieved from http://www.scsglobalservices.com/floorscore
- U.S. Environmental Protection Agency. (2013, September). *Significant new uses: Perfluoroalkyl sulfonates and long-chain perfluoroalkyl carboxylate chemical substances.* Retrieved from http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPPT-2012-0268-0034

2.8. Noise.

Requirement:
The structure and facilities shall be maintained so that the noise level in the interior of the dwelling unit caused by exterior sources is below 45 dB L_{dn} (day-night equivalent sound level).

Stretch Provisions:

- Nighttime noise levels within bedrooms shall not exceed 30 dB LA_{eq} measured over eight hours.
- HVAC equipment, including intermittent ventilation fans, shall operate at a noise level that creates no more than 45 dB L_{dn} in habitable rooms.
- Wall and ceiling assemblies shall meet performance standards to attenuate exterior sound reaching occupants or be constructed using materials with sound-dampening acoustical properties.
- Roof material, chimney baffles, exterior doors, mail slots, attic ventilation ports, wall-mounted air conditioners, and other building components that have the potential to admit excessive noise shall be configured to minimize sound intrusion.
- Windows shall be sealed, made weathertight, and caulked to minimize sound intrusion when closed.

Rationale:
The World Health Organization (WHO) has identified and documented seven categories of adverse health effects of noise pollution on humans: hearing impairment, speech intelligibility, disturbances in sleep and cardiovascular function; mental health, negative social behavior and annoyance reactions, and impaired task performance. The negative health impacts of noise are related to the total noise exposure experienced from all noise sources in the environment and can lead to a combination of these different negative impacts. Additionally, noise exposure disproportionately impacts certain segments of the population. Infants, children, those with mental or physical illnesses, and the elderly are particularly vulnerable to noise pollution.

References:

- Berglund, B., Lindvall, T., & Schwela, D. (1999). *Guidelines for community noise.* Geneva: World Health Organization. Retrieved from who.int/docstore/peh/noise/guidelines2.html
- Hagler, L. (1999). *Summary of adverse health effects of noise pollution.* Retrieved from http://www.noiseoff.org/document/who.summary.pdf
- Harris, D. A. (1997). *Noise control manual for residential buildings.* New York, NY: McGraw-Hill Professional.
- State of California. (1974). *Health and safety code.* §17922.6, Noise insulation standards.

Resources:

- Standard for Maximum Interior Noise Level, 24 C.F.R. § 51.101(a)(9) (1998).
- U.S. Department of Housing and Urban Development. (n.d.). *Sound transmission class guidance.* Retrieved from http://portal.hud.gov/hudportal/documents/huddoc?id=DOC_16419.pdf

3. SAFETY AND PERSONAL SECURITY

3.1. Egress.

Requirement:
In accordance with local fire codes, every dwelling unit shall have at least two means of egress that serve as emergency escapes and rescue openings. Each egress shall lead outside without passing through another dwelling unit.

3.1.1. Egress routes shall be unobstructed. Doors along egress routes shall be openable from the inside without the use of a key or tool.

3.1.2. Any bedroom located below the fourth floor shall be provided with an exterior window openable from the inside that can be used as a means of emergency egress.

3.1.3. If a habitable room partly or totally below grade is intended for sleeping purposes, at least one exterior window shall be openable from the inside and accessible for easy and ready use as an emergency exit. The window shall have the following minimum dimensions: a net clear opening of 5.7 ft^2 (0.53 m^2); 24 inches (61 cm) from the top of the sill to the bottom of head of the window frame; a width of 20 inches (51 cm); and a sill height of not more than 44 inches (112 cm) from the floor.

3.1.3.1. If the window opening sill height is below ground elevation, the horizontal dimension (width times projection) of the window well shall be at least nine ft^2 (0.84 m^2) and the horizontal projection shall extend at least 36 inches (91 cm) from the exterior side of the window.

3.1.3.2. If the egress window well is deeper than 44 inches (112 cm) below ground elevation, there shall be steps or a ladder permanently attached to serve as an emergency exit to ground elevation. The distance between steps or rungs shall be 18 inches (46 cm), their width shall be at least 12 inches (31 cm), and their projection from the wall shall be between three and six inches (7.6 and 15 cm).

3.1.3.3. A door leading directly from the room to the outside that provides an exit at grade level shall fulfill this requirement.

Rationale:
Escape from fire is an important public safety protection. Proper configuration of egress will prevent falls that can result in physical injury, such as bruising, fractures, head, brain, and spinal injuries; allow the timely evacuation of residents in an emergency; and permit entry by rescue workers wearing emergency equipment on their backs.

References:

- International Code Council. (n.d.). *Accessible means of egress.* Retrieved from http://www.iccsafe.org/safety/Documents/MeansofEgressBroch.pdf
- International Code Council. (2012). *International fire code,* Chapter 10.
- International Code Council. (2012). *International residential code,* §§ 310, 311.

3.2. Locks/Security.

Requirement:
Means of egress (i.e., windows and/or doors) from dwellings shall have locks.

3.2.1. Following each change in tenancy, the locking devices on the dwelling unit entry doors shall be changed.

3.2.2. Dwelling unit entry doors shall be equipped with a dead bolt lock with a minimum throw of one inch (2.54 cm) that is capable of being opened from the interior side without a key and a device that permits the occupant to see a person at the entry door without fully opening the door.

3.2.3. Exterior doors on multifamily buildings with a common entry that leads into a foyer or hallway shall have a self-closing mechanism and shall be equipped with a locking device capable of being opened from the interior side without a key.

3.2.4. Exterior windows that are capable of being opened and are potential means of entry shall be equipped with a lock on the interior side.

Rationale:
Inadequate home security may result in a fear of a possible burglary occurrence or recurrence, stress caused by a burglary, and injuries caused to occupants by an intruder (aggravated burglary). The most common harm suffered as a result of burglary or fear of burglary is emotional stress. The emotional impact is greater for burglaries where there is successful entry to the dwelling. The risk of entry increases with declining levels of security.

References:

- U.S. Department of Housing and Urban Development—Office of Healthy Homes and Lead Hazard Control. (2010). *Healthy home rating system—Operating guidance*. Retrieved from http://portal.hud.gov/hudportal/documents/huddoc?id=operating_guidance_hhrs_v1.pdf

3.3. Smoke Alarm.

Requirement:
Every dwelling unit shall have a functioning smoke alarm located on the ceiling outside each sleeping area in the immediate vicinity of the bedrooms, in each additional room used for sleeping purposes, and on every level except crawlspaces and uninhabitable attics. In dwellings or dwelling units with split levels that have no door between adjacent levels, the smoke alarm installed on the upper level shall suffice for the adjacent lower level. In the event a smoke alarm sounds, the cause of the alarm condition shall be identified and corrected.

3.3.1. In multifamily housing, a tamper-proof smoke detection system (interconnected with a central fire alarm system) or stand-alone smoke alarms in good working condition shall be installed on each level including basements, in heating system and storage rooms, in garages, and in other common areas.

3.3.2. Battery-operated smoke alarms and the battery backup for hardwired smoke alarms shall be powered with long-lasting batteries.

3.3.3. Alternative visual notification shall be provided for hearing-impaired occupants.

Stretch Provisions:
- Smoke alarms shall be hardwired with battery backup.
- Smoke alarm batteries shall be sealed-in and tamper-proof.
- Multiple smoke detection stations shall be interconnected.
- Every dwelling unit shall have both a photoelectric smoke alarm and an ionization smoke alarm.

Rationale:
Smoke alarms that are properly installed and maintained play a vital role in reducing fire-related deaths and injuries. Having a working smoke alarm reduces the chances of dying in a reported fire by half. When smoke alarms fail to operate, it is usually because batteries are missing, disconnected, or dead. Research has demonstrated that almost one-quarter of smoke alarm failures were due to dead batteries. Interconnection of smoke alarms allows the warning to reach all occupants at the same time.

Ionization smoke alarm sensors are best suited to detect smoke from highly combustible materials that can create flaming fires, such as flammable liquids, newspapers, and paint cleaning solutions. Photoelectric models are best suited for living rooms, bedrooms, and kitchens, which often contain large pieces of furniture, such as sofas, chairs, mattresses, countertops, et cetera, which will burn slowly and create more smoldering smoke than flames.

References:

- Cleary, T. (2009). *Performance of dual photoelectric/ionization smoke alarms in full-scale fire tests*. Gaithersburg, MD: National Institute of Science and Technology Building and Fire Research Laboratory. Retrieved from http://www.nfpa.org/~/media/files/training/conference%20and%20expo/2009%20proceedings/performance_of_combination_photelectric-ionization_smoke_ala.pdf

- International Code Council. (2012). *International fire code,* § 907.
- National Fire Protection Association. (n.d.). *Smoke alarm safety at home.* Retrieved from: http://www.nfpa.org/~/media/files/safety%20information/safety%20tip%20sheets/smokealarmssafetytips.pdf

3.4. Fire Extinguisher.

Requirement:
Fire extinguishers shall be rated Class ABC and shall be readily accessible.

3.4.1. Each dwelling unit shall have at least one 10-pound fire extinguisher in good working condition in or near the kitchen.

3.4.2. In multifamily housing, there shall be fire extinguishers in common areas on each floor and in areas where flammable or combustible liquids are stored, used, or dispensed. The fire extinguishers shall be located in conspicuous, unobstructed locations that are not obscured from view.

Stretch Provision:

- The dwelling shall have an automatic fire sprinkler system that complies with the applicable locally adopted fire code. If the local fire code has no sprinkler requirement or if no local fire code exists, the installed automatic fire sprinkler system shall comply with either the International Fire Code© or the National Fire Protection Association Standard 1.

Rationale:
Cooking equipment is the second-leading cause of apartment or multifamily housing fire deaths, ranking only behind smoking. Kitchens are the leading area of origin for home structure fires: approximately two of every five (42 percent) home structure fires started in the kitchen or cooking area. Sixteen percent of the civilian deaths, 38 percent of the civilian injuries, and 14 percent of the direct property damage resulted from these fires. Two-thirds (66 percent) of the reported apartment or multifamily housing fires and one-third (33 percent) of the fires in one- or two-family homes originated in the kitchen. When an extinguisher is used, it put out the fire completely in half of the cases and minimized the fire but did not completely put it out in almost one-quarter of the incidents.

Reference:

- Ahrens, M. (2013). *Home fires involving cooking equipment.* National Fire Protection Association. Retrieved from http://www.nfpa.org/research/reports-and-statistics/fire-causes/appliances-and-equipment/cooking-equipment

3.5. Carbon Monoxide Alarm.

Requirement:
Every dwelling unit shall have at least one functioning carbon monoxide (CO) alarm on every habitable floor and outside each separate sleeping area, in the immediate vicinity of every bedroom. In the event a CO alarm sounds, the cause of the alarm condition shall be identified and corrected.

3.5.1. Battery-operated CO alarms shall be powered with long-lasting batteries. Hardwired CO alarms shall have long-lasting battery backup.

3.5.2. Alternative visual notification shall be provided for hearing-impaired occupants.

Stretch Provisions:

- CO alarms and combination smoke/CO alarms shall include voice notification.
- If a combination ionization sensor smoke/CO alarm is used, a second smoke alarm utilizing photoelectric smoke sensors shall be installed.
- Smoke alarm batteries shall be sealed-in and tamper-proof.
- CO present at or above 30 ppm (35 mg/m^3) when measured over one hour, or above nine ppm (10.5 mg/m^3) measured over eight hours, shall be deemed hazardous. The cause of a hazardous indoor CO level shall be investigated to identify and eliminate its source.

Rationale:
CO is a colorless, odorless, and extremely toxic gas. Blood hemoglobin has a greater affinity for CO than it does for oxygen, which means that inhalation of this gas will reduce the ability of the blood to take up oxygen. At high concentrations, CO can cause unconsciousness and death. The highest rate of deaths from CO poisoning occurs in older age groups, especially in people aged 75-plus years. This may be for several reasons, including the increasing prevalence of cardiovascular illness and neurological decline at older ages and the fact that the elderly tend to spend a high proportion of their time at home indoors.

At lower concentrations, CO may cause a range of symptoms from headaches, dizziness, weakness, nausea, confusion, and disorientation to fatigue. These symptoms are sometimes confused with influenza and sometimes with depression. In people with ischemic heart disease, it can result in episodes of increased chest pain. CO may also impair fetal development. Those most vulnerable to ill health effects caused by low-level CO exposure include unborn children, infants, children, the elderly, and people with anemia or heart or lung disease.

References:

- American Academy of Pediatrics Council on Environmental Health. (2012). Carbon monoxide, in Etzel R. A., ed. *Pediatric environmental health, 3rd edition.* Elk Grove Village, IL: American Academy of Pediatrics, 367–377.
- National Fire Protection Association. (2012, August 13-14). NFPA technical committee on residential occupancies, NFPA 101 and NFPA 5000 first draft meeting minutes. Retrieved from http://www.nfpa.org/assets/files/aboutthecodes/101/bld-saf-res_fdminutes-08-12.pdf
- National Fire Protection Association. (2009). *NFPA 720, Standard for the installation of carbon monoxide (CO) detection and warning equipment.*
- Underwriters Laboratories. (2009). *ANSI/UL 2034, Standard for single and multiple station carbon monoxide alarms.*
- U.S. Consumer Product Safety Commission. (2001, January). CPSC recommends carbon monoxide alarm for every home. Retrieved from http://www.cpsc.gov/en/Recalls/2001/CPSC-Recommends-Carbon-Monoxide-Alarm-for-Every-Home/
- U.S. Consumer Product Safety Commission. (n.d.). Carbon monoxide questions and answers. http://www.cpsc.gov/en/Safety-Education/Safety-Education-Centers/Carbon-Monoxide-Information-Center/Carbon-Monoxide-Questions-and-Answers-/
- U.S. Environmental Protection Agency. (n.d.). An introduction to indoor air quality (IAQ): Carbon monoxide. http://www.epa.gov/iaq/co.html
- World Health Organization. (2010). *Guidelines for indoor air quality: Selected pollutants.* Copenhagen: World Health Organization Regional Office for Europe. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0009/128169/e94535.pdf

3.6. Walking Surfaces.

Requirement:
Every interior and exterior stairway, ramp, deck, porch, and balcony shall be maintained structurally sound, in good repair, properly anchored, and capable of supporting the imposed loads.

3.6.1. Treads on exterior stairways shall have nonskid surfaces.

3.6.2. Every interior and exterior stairway with four or more risers shall have at least one structurally sound continuous handrail installed not less than 34 inches (86.7 cm) and not more than 38 inches (96.5 cm), measured vertically from above the nose of the tread. The handrail shall be firmly fastened, capable of supporting a load of 300 pounds, and in good condition. If a side of a stairway is open to the floor or grade below, and the handrail provides the guard required by Subsection 3.7, the rail shall be supported by balusters 34 to 38 inches (86.7 to 96.5 cm) in height, measured vertically from the nose of the tread.

Stretch Provisions:

- Every interior and exterior stairway shall have uniform risers and treads. Risers shall be no higher than 7¾ inches (19.6 cm) and treads shall be at least 10 inches (25.4 cm) deep, unless the existing space and construction do not allow a reduction in pitch or slope.
- Interior and exterior stairways shall have handrails on both sides. Railings shall have a graspable perimeter measuring four to six inches (10–16 cm), and if noncircular in shape, shall have no sharp corners and a width no smaller than five-eighths inch (1.5 cm).

Rationale:

Inadequate handrails and railings on stairways, ramps, decks, porches, and balconies can result in slips, trips, and falls that cause physical injury, such as bruising; fractures; head, brain, and spinal injuries; and death. The likelihood of a fall is doubled if there is no wall or guarding to one side of the stair. Similarly, the lack of any handrail doubles the likelihood of a fall, even if there is a wall to both sides of the stairs. Stair tread depth affects stability during stair descent. The nature of injury is in part dependent on the distance of a fall, and in part on the nature of the surface onto which the victim falls. Although falls on level ground tend to result in relatively minor injuries as compared to other falls, they occur more frequently.

References:

- International Code Council. (2012). *International residential code,* §§ 311.7, 312.1.2, 312.1.3, 312.2.1.
- MetLife. (2013). *The essentials: Falls and fall prevention.* Retrieved from https://www.metlife.com/assets/cao/mmi/publications/essentials/mmi-falls-fall-prevention-essentials.pdf
- U.S. Department of Housing and Urban Development—Office of Healthy Homes and Lead Hazard Control. (2010). *Healthy home rating system—Operating guidance.* Retrieved from http://portal.hud.gov/hudportal/documents/huddoc?id=operating_guidance_hhrs_v1.pdf

Resources:

- Roys, M. (2013). *Refurbishing stairs in dwellings to reduce the risk of falls and injuries.* Garston, U.K.: IHS Building Research Establishment Press.

3.7. Guards.

Requirement:

3.7.1. Every stairway, porch, patio, landing, and/or balcony located more than 30 inches (76.2 cm) above an adjacent area shall have a structurally sound guard between 30 inches (76.2 cm) and 42 inches (107 cm) high, measured vertically from the floor. The guard shall be firmly fastened, capable of supporting normally imposed loads, capable of being opened in case of emergency, and in good condition. Balusters with a minimum thickness of one-half inch (13 mm) shall be placed at intervals that do not allow passage of a sphere greater than four (10.2 cm) inches in diameter. There shall be no climbable cross pieces. If the balusters do not reach the floor, the narrowest opening between the bottom of the stair guard and the floor shall be a maximum of four inches (10.2 cm).

3.7.2. If the vertical distance from the top of the sill of an exterior window opening to the finished grade or other surface below is greater than 72 inches (183 cm), and the vertical distance from the top of the sill to the floor of the room is less than 36 inches (91.5 cm), the window shall have a fall prevention device compliant with ASTM F2006 or ASTM F2090.

3.7.2.1 The fall prevention device for a window that provides access to a fire escape or is otherwise designated for emergency egress shall be compliant with ASTM F2090.

Rationale:

Falls can result in physical injury, such as bruising; fractures; and head, brain, and spinal injuries, as well as death. The nature of injury is in part dependent on the distance of a fall, and in part on the nature of the surface onto which the victim falls. Each year, 5,100 children younger than 18 years of age are treated in U.S. hospital emergency departments for injuries related to falls from windows. Such falls account for approximately eight deaths among children ages five and under each year. Falls from windows cause more severe injuries and deaths than any other

type of fall. A commercially available window guard designed to swing open to allow escape in the event of a fire costs as little as $20. After window guard requirements took effect in Boston and New York City, the incidence of falls by children from windows decreased 96 percent over10 years.

References:

- American Society of Testing and Materials. (2010). *F2006, Standard safety specification for window fall prevention devices for non-emergency escape (egress) and rescue (ingress) windows.*
- American Society of Testing and Materials. (2010). *F2090, Standard specification for window fall prevention devices with emergency escape (egress) release mechanisms.*
- City of New York. (2012, June). *Rules.* Title 24 §12, Window guard regulations. Retrieved from http://www.nyc.gov/html/doh/html/environmental/win-regs.shtml
- Harris, V., Rochette, L. M., and Smith, G. (2011, September). Pediatric injuries attributable to falls from windows in the United States 2001–2008. *Pediatrics, 128*, 455–462.
- International Code Council. (2012). *International property maintenance code,* § 307.1.
- International Code Council. (2013, April). Climbable guards. Retrieved from http://www.iccsafe.org/cs/CTC/Documents/0413-meeting/ChildWindowSafety.pdf
- MetLife. (2013). *The essentials: Falls and fall prevention.* Retrieved from https://www.metlife.com/assets/cao/mmi/publications/essentials/mmi-falls-fall-prevention-essentials.pdf
- National Fire Protection Association. (2006). *101 Life safety code.* § 7.2.2.4.5.3.
- Nationwide Children's Hospital. (n.d.). Window falls. http://www.nationwidechildrens.org/cirp-window-falls
- Roys, M. (2013). *Refurbishing stairs in dwellings to reduce the risk of falls and injuries.* Garston, U.K.: IHS Building Research Establishment Press.

3.8. Chemical Storage.

Requirement:

3.8.1. Each dwelling unit shall have a cabinet or other storage space that is lockable or not readily accessible to children for the storage of medicine and household chemical agents.

3.8.2. Storage space for flammable and combustible liquids shall be available either in a building separate from the dwelling's habitable space or in an adjacent space that is not connected to the dwelling's ventilation system.

Rationale:

Poison control centers answer more than 3.6 million calls each year, or one call every eight seconds. According to the American Association of Poison Control Centers, children younger than six years old account for about half of the calls placed to poison centers. A flammable or combustible liquid, gas, or associated piping or filter is the main contributor in four percent of fires and eight percent of fire-caused deaths.

References:

- American Association of Poison Control Centers. (n.d.). www.aapcc.org
- U.S. Environmental Protection Agency, Poison Prevention Program. (n.d.). http://www.epa.gov/pesticides/health/poisonprevention.htm

3.9. Pools, Hot Tubs, and Other Water Features.

Requirement:

3.9.1. Swimming pools, hot tubs, spas (except a residential spa or hot tub with a safety cover complying with ASTM F 1346-91), ornamental ponds, and other water features that hold water more than 24 inches (61 cm) in depth shall be completely surrounded by a fence or barrier at least 48 inches (122 cm) in height above the finished ground level that is accessible only through a self-closing and self-latching gate. The gate's latch shall

be located 54 inches (137 cm) above the bottom of the gate on the interior side of the gate facing the water feature. The fence and gate shall not have climbable crosspieces.

3.9.2. All pools and spas shall have anti-entrapment drain covers compliant with ANSI/ASME A112.19.8, ANSI/APSP 16-2011, or any successor standard on every suction outlet.

3.9.3. Pool drains and drain covers shall be clearly visible and in good repair. Where there is a single main drain (other than an unblockable drain), a second anti-entrapment system shall be installed.

3.9.4. Luminaries, receptacles, and other outlets shall have ground-fault circuit interrupter (GFCI) protection.

Rationale:
It takes only inches of water for a small child to drown, so taking extra safety steps at home and around pools, spas, and all bodies of water can prevent drowning incidents. The majority of deaths and injuries in pools and spas involve children ages one to two and occur in residential settings. Drowning is the leading cause of unintentional death to children ages one to four and the second-leading cause of injury-related death in children aged one to 14 years in the U.S.

Children can become entrapped and held under water by suction openings in broken, uncovered, or poorly covered drains. Hair, jewelry, and bathing suit entanglement, as well as the lodging of arms, legs, fingers, or other body parts can pose entrapment hazards. Sitting on a broken or uncovered drain may cause evisceration injuries or disembowelment.

References:

- Consumer Product Safety Commission. (n.d.). *Requirements for public pools.* Retrieved from http://www.poolsafely.gov/industry-operators-professionals/public-pool-requirements/
- Consumer Product Safety Commission. (n.d.). *Safety barrier guidelines for residential pools.* Retrieved from http://www.poolsafely.gov/wp-content/uploads/362.pdf
- International Code Council. (2012). *International property maintenance code,* §§ 303, 605.3.
- International Code Council. (2012). *International residential code,* § E4203.
- Virginia Graeme Baker Pool and Spa Safety Act. 15 U.S.C. §§ 8001–8008. (2007).

4. LIGHTING AND ELECTRICAL SYSTEMS

4.1. Electrical System.

Requirement:
Every dwelling unit shall have electric service, outlets, and fixtures that are grounded and installed properly, maintained in good and safe working condition, and connected to a source of electric power.

4.1.1. Every dwelling unit shall be supplied with a three-wire, 120/240-volt, single-phase electrical service that is not shared with another dwelling unit.

4.1.2. Temporary wiring or extension cords shall not be used as permanent wiring.

Stretch Provision:

- The electrical service shall have a rating of not less than 100 amperes.

Rationale:
Faulty electrical systems result in fires, damage to property, burns, injuries, and death. In residential settings, children are more likely to be injured than adults, primarily from inserting household objects into electrical outlets.

References:

- Electrical Safety Foundation International. (n.d.). *Electrical safety workbook: A guide to understanding and maintaining your home's electrical system*. Retrieved from www.esfi.org
- U.S. Fire Administration. (n.d.). Electrical fire safety outreach materials. Retrieved from http://www.usfa.fema.gov/citizens/home_fire_prev/electrical.shtm

4.2. Outlets.

Requirement:
Every habitable room shall have at least two separate and remote grounded duplex electric receptacle outlets.

4.2.1. Each kitchen and each room containing a toilet, sink, bathtub, or shower stall shall have at least one grounded duplex electric receptacle outlet protected by ground-fault circuit interrupter (GFCI).

4.2.2. Receptacle outlets in garages, crawl spaces, unfinished basements, and outdoors shall be protected by GFCIs.

Stretch Provisions:

- Habitable rooms shall have sufficient receptacle outlets so that no location on a wall is more than six feet from an outlet.
- Every countertop space 12 inches (305 mm) or wider shall have a grounded duplex electric convenience receptacle outlet protected by a GFCI. No section of counter shall be more than 24 inches (610 mm) measured horizontally from an outlet.
- Receptacle outlets in habitable rooms that are not protected by GFCIs shall be protected by arc-fault circuit interrupters (AFCIs).

Rationale:
Unlike circuit breakers and fuses, GFCIs are installed to protect the user from electrocution. These devices provide protection against electrical shock and electrocution from ground faults or contact with live parts by a grounded individual. They constantly monitor electrical currents flowing into a product. If the electricity flowing through the product differs even slightly from that returning, the GFCI will quickly shut off the current. GFCIs detect amounts of electricity much smaller than those required for a fuse or circuit breaker to activate and shut off the circuit. UL lists three types of GFCIs designed for home use that are readily available, fairly inexpensive, and simple to install. AFCIs prevent electrical fires by protecting branch circuits.

References:

- International Code Council. (2012). *International residential code.* § E3901, E3902.1.
- National Fire Protection Association. (2013). *Standard 70, national electrical code.* Retrieved from http://www.nfpa.org/70
- U.S. Centers for Disease Control and Prevention & U.S. Department of Housing and Urban Development. (2006). *Healthy housing reference manual.* Retrieved from www.cdc.gov/nceh/publications/books/housing/housing.htm

4.3. Natural Lighting.

Requirement:
Every habitable room shall receive daylight from at least one exterior window or skylight.

4.3.1. If a habitable room receives daylight from an adjacent room or area used seasonally, such as a porch, the daylight through this interconnection shall be available year-round.

4.3.2. Every bathroom and kitchen shall comply with the daylight requirement for habitable rooms contained in this section, unless the room is equipped with a ventilation system consistent with Subsection 5.3.

Rationale:
Research has revealed a strong relationship between light and human physiology. The effects of light on both the human eye and human skin are notable. Light allows us to see and affects body rhythms and psychological health. Lack of natural lighting has been linked to depression.

References:

- International Code Council. (2012). *International property maintenance code,* § 402.1, 403.2.
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4.4. Artificial Lighting.

Requirement:
Each room containing a toilet, sink, bathtub, or shower stall shall contain at least one ceiling- or wall-type electric lighting fixture. Each non-habitable room, including laundry rooms, furnace rooms, and public halls, shall contain at least one ceiling- or wall-type electric lighting fixture.

4.4.1. Light switches that control ceiling- or wall-type electric light fixtures shall be located conveniently for safe use.

4.4.2. Every public hall, exterior entry door, and stairway in multifamily housing shall be illuminated at all times by ceiling- or wall-type electric lighting fixtures providing 800 lumens for every 200 ft^2 (18.6 m^2) of floor area. The distance between light fixtures shall not be greater than 30 feet (762 cm).

4.4.3. In a building containing one or two dwelling units, every public hall, exterior entry door, and stairway shall be illuminated by ceiling- or wall-type electric lighting fixtures providing 800 lumens for every 200 ft^2 (18.6 m^2) of floor area that is controlled by a three-way switch or a motion-activated device.

Stretch Provisions:

- Polychlorinated-biphenyl (PCB)-containing lighting ballasts (e.g., older pre-1978 T-12 lighting ballasts) shall be removed, replaced with lighting fixtures that do not contain PCBs, and disposed of in accordance with applicable state and federal regulations.

- The lighting fixtures in public halls, stairways, and entries shall provide 1600 lumens for every 200 ft^2 (18.6 m^2) of floor area.
- The parking areas and walkways of multifamily housing shall be illuminated by outdoor lighting devices suitable for the premises.

Rationale:
Adequate lighting is important in allowing people to see unsanitary conditions and to prevent injury, thus contributing to a healthier and safer environment. Improper indoor lighting can also contribute to eyestrain from inadequate illumination, glare, and flicker. Artificial light is particularly important where domestic tasks require adequate light; for example, in the kitchen over worktops, sinks, and ranges.

References:

- International Code Council. (2012). *International property maintenance code,* § 402.2.
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5. THERMAL COMFORT, VENTILATION, AND ENERGY EFFICIENCY

5.1. Heating, Ventilation, and Air Conditioning Systems.

Requirement:
Facilities for heating, cooling, ventilation, and humidity control shall be maintained in good working condition and operated when necessary for the health and comfort of the occupants and in accordance with the design capacity of the installed equipment. Within 48 hours after equipment has become inoperative due to a mechanical problem or power failure other than a utility outage, an alternative safe source of necessary heating, ventilating, or cooling shall be provided.

5.2. Heating System.

Requirement:
Except in Climate Zone 1, every dwelling shall have a properly installed heating system in good and safe working condition that is capable of safely and adequately heating all habitable rooms, bathrooms, and toilet rooms. The heating system, filtration components, distribution components, heating elements, and cooling elements (if provided), shall be sealed, cleaned, maintained, and operated in accordance with manufacturer specifications and shall be inspected and serviced annually by a licensed heating, ventilation, and air conditioning systems contractor.

5.2.1. Venting and Air Supply for Heating Equipment. Furnaces, water heaters, wood stoves, and other devices that employ combustion-burning fuel shall be vented to the outside of the structure in an approved manner that meets manufacturer specifications and is in compliance with applicable codes and standards (e.g., ANSI 223.1/NFPA 54 National Fuel Gas Code, NFPA 31 Standard for the Installation of Oil-Burning Equipment, NFPA 211 Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances) and shall be supplied with sufficient air to support the continuous complete combustion of fuel and prevent backdrafting.

5.2.2. Minimum Heat Temperature. The heating system shall be capable of maintaining a minimum room temperature of 68° F (20° C) in every habitable room, bathroom, and toilet room.

5.2.3. Heating Supply. If the dwelling unit is rented, leased, or let on terms either expressed or implied that heat will be supplied, heat shall be provided to maintain a minimum temperature of 68° F (20° C) in habitable rooms, bathrooms, and toilet rooms; and at no time during the heating season shall the system allow the temperature to exceed 78° F (25° C) in any room.

5.2.4. Forced-Air Systems. Any dwelling with a forced-air system shall have at least one thermostat within each dwelling unit capable of controlling the heating system, and cooling system if provided, to maintain temperature set point between 55° F (13° C) and 85° F (29° C) at different times of the day. The system shall have a clean air filter installed in accordance with manufacturer specifications at each change in tenancy and at least annually. This filter shall have a minimum efficiency reporting value of eight (MERV-8) unless the system is not equipped to use a MERV-8 filter.

5.2.5. Steam and Hot Water Systems. In dwellings with heating equipment utilizing steam or hot water with a temperature of 110° F (43° C) or greater, protective covers/barriers shall be installed on and maintained for exposed surfaces of baseboard units, radiators, and piping between radiators.

5.2.6. Wood Stoves. A wood stove manufactured after June, 1988 shall have a manufacturer's label certifying compliance with the emission standard at 40 C.F.R. § 60 part AAA. Clearance of 30 inches (76 cm) shall be maintained between combustible materials and a stove with no heat shield. Where a heat shield is present, the clearance between combustible materials and the stove shall be compliant with manufacturer specification for the heat shield.

Stretch Provisions:

- Any new combustion heating equipment installed in occupied or conditioned spaces shall be power-vented or sealed (direct-vented) combustion equipment.
- The heating system shall be controlled by a programmable thermostat to avoid temperature extremes.

- The dwelling shall have provisions to maintain the indoor temperature below a maximum of 85° F (29° C) through the use of mechanical air conditioning, ventilation systems, or passive design features.
- Air filters shall be replaced at least every three months.

Rationale:
Exposure to cold temperatures can lead to hypothermia, frostbite, and death. There is a continuous relationship between indoor temperature and vulnerability to cold-related death. As temperatures rise, thermal stress increases, initially triggering the body's defense mechanisms, such as sweating. High temperatures can increase dehydration, cardiovascular strain, and trauma, and, when temperatures exceed 77° F (25° C), cause mortality and stroke.

Poorly maintained HVAC systems may pose safety risks, including fire and explosion hazards and exposure to combustion-related chemical and physical agents, such as carbon monoxide and particulate matter. Exposure to carbon monoxide can lead to headaches, nervous systems effects, and asphyxiation.

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5.3. Ventilation.

Requirement:
Natural or mechanical ventilation, or a combination of the two, shall deliver fresh air to every habitable room and bathroom and be capable of removing moisture-laden air and other contaminants generated during cooking, bathing, and showering.

5.3.1. Every dwelling shall have a ventilation system compliant with ASHRAE Standard 62.2 (Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings) or ASHRAE 62.1 (Ventilation for Acceptable Indoor Air Quality) as applicable to the dwelling.

5.3.2. The air exhausted from a bathroom, toilet room, kitchen, clothes dryer, or basement shall not be vented into any other parts of the building's habitable space or an attic; such air shall discharge directly to the outdoors but not near any intake on the building exterior.

5.3.2.1. The exhaust vent from a clothes dryer shall consist of a rigid or corrugated semi-rigid metal duct.

5.3.3. Pipes, ducts, conductors, fans, and blowers shall not discharge gases, steam, vapor, hot air, grease, smoke, odors, or other gaseous or particulate wastes directly upon abutting or adjacent public or private property or that of another occupant. Vent pipe openings and any pest-proofing screens that cover them shall be maintained free of debris.

5.3.4. Basement air shall not be used as supply air for an air handling system.

Stretch Provision:

- HVAC equipment shall have the capacity to maintain indoor relative humidity (RH) at or below 60 percent.

Rationale:
Proper circulation of outdoor ventilation air throughout a habitable space, naturally through openings in the building envelope and/or mechanically using fans and HVAC systems, is important to dilute and remove airborne indoor chemical agents, and reduce airborne transmission of biological agents, humidity, and mold. Inadequate ventilation also increases carbon dioxide in habitable spaces, which may yield drowsiness and headaches and can result in elevated levels of volatile organic chemicals that off-gas from interior dwelling components. Inadequate ventilation also increases interior humidity. Studies show the association between dampness and poor health. Damp environments are associated with the growth of dust mites, cockroaches, and mold. Some of the health effects include worsened asthma, wheezing, nausea and vomiting, headaches, fever, and diarrhea. Inadequately maintained or operated HVAC systems can lead to microbial growth.

References:

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5.4. Air Sealing.

Requirement:

Openings into dwellings and dwelling units shall be sealed to limit uncontrolled air movement.

5.4.1. Exterior doors, windows and skylights, openings where siding and chimneys meet, utility penetrations, electrical outlets, and other openings shall be weathertight.

5.4.1.1. Pads, door sweeps, weather stripping, and seals shall be used and maintained to minimize air leaks.

5.4.2. Openings separating an attached garage from a habitable room, including doors, ceilings, floors, and utility and ductwork penetrations, shall be sealed.

5.4.2.1. Any doorway between a habitable room and a garage shall be equipped with a wood door not less than 1⅜ inches (35 mm) in thickness, a solid or honeycomb core steel door not less than 1⅜ inches (35 mm) thick, or a 20-minute fire-rated door. The door shall have an automatic closing mechanism and be sealed with weather stripping.

5.4.2.2. There shall be no door, window, or other opening from a garage into a room used for sleeping purposes.

5.4.3. Heating and air conditioning system ductwork and air handling units located in an attached garage shall be correctly insulated and sealed.

5.4.3.1. There shall be no supply or return vent openings in a garage that connect to air handlers serving habitable spaces.

5.4.4. In a multifamily building, walls, ceilings, and floors that separate a dwelling unit from neighboring units, corridors, chases, stairwells, and other openings shall be sealed.

Stretch Provision:

- Air handling equipment and associated ductwork shall be relocated from a garage to an area within the conditioned space.

Rationale:

Controlling air leakage into homes can save the occupant money by making the home energy efficient and can prevent health problems associated with moisture. Airborne moisture can lead to mold growth, which causes respiratory distress in children and adults, including those with asthma, allergies, or other respiratory diseases. Air-sealing and isolation of attached garages is important to prevent migration of carbon monoxide and other airborne chemical agents (e.g., from vehicle exhaust, fuels, solvents, and other chemicals stored or used in the garage) into habitable rooms. Sealing of each unit can help prevent migration of smoke, cooking odors, noise, radon, pests, and other elements into the dwelling unit.

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6. MOISTURE CONTROL, SOLID WASTE, AND PEST MANAGEMENT

6.1. Moisture Prevention and Control.

Requirement:
Every foundation, roof, roofing component, exterior wall, door, skylight, and window shall be watertight, weathertight, free of persistent dampness or moisture, and in good condition.

6.1.1. The building's drainage system, such as footing or foundation drains, gutters, downspouts, rainwater collection containers, or other elements, shall direct water away from the structure.

6.1.2. Exterior wood surfaces shall be protected from the elements and decay by paint or other protective treatment. Weep holes in brickwork shall be left open.

6.1.3. Premises shall be graded and maintained to prevent the erosion of soil and to prevent the accumulation of water on the premises, within a crawlspace, or within the structure.

6.1.4. Interior and exterior surfaces and surface coverings, such as but not limited to carpet, wood, cellulose insulation, and paper, paint, and other wall coverings, including paper-faced gypsum board, shall have no signs of visible mold growth or chronic or persistent excessive dampness or moisture.

6.1.5. Building material that is discolored or deteriorated by mold or mildew or causes a moldy or earthy odor shall be cleaned, dried, and repaired. Structurally unsound material shall be removed and replaced.

6.1.5.1. Removal and repair of moldy material shall be conducted in accordance with New York City's *Guidelines on Assessment and Remediation of Fungi in Indoor Environments*, the Institute of Inspection, Cleaning, and Restoration Certification's *IICRC S520 Standard and Reference Guide for Professional Mold Remediation*, or the EPA guidelines for *Mold Remediation in Schools and Commercial Buildings*.

6.1.6. The underlying cause of excessive dampness or moisture or moldy or earthy odor shall be investigated and corrected.

6.1.7. Cold HVAC and plumbing components and systems (e.g., chilled-water pipes and valves, refrigerant piping, and valves) in readily accessible locations shall be sufficiently and continuously insulated to keep the temperature of their surfaces at least 10° F (4° C) above the dew point of the surrounding air.

6.1.8. Unless the crawl space is sealed and insulated from the outdoors, the crawl space shall be free of high-moisture conditions or be separated from the dwelling by an air seal or other method suitable to the climate and conditions.

Stretch Provisions:

- Exterior weather-resistant barrier systems shall be used to reduce potential for water leaks and moisture intrusion.
- Water/mold-resistant materials shall be used on bathroom walls and floors, showers, and other areas of the home that are likely to be exposed to moisture.
- In warm-humid and mixed-humid climates:
  - Exterior wall insulations shall not include a vapor barrier/retarder material on the interior side (such as plastic sheeting or foil facing), with the exception of closed-cell foam insulation (spray or rigid), kraft-faced insulation, and seasonally adjusting membranes.
  - There shall be no vinyl wallpaper or other impermeable interior finish on the interior surface of exterior walls within an air-conditioned dwelling.
  - Exterior drainable rigid insulation systems shall be used to reduce wall assembly condensation risk.
- The building and its systems shall meet the following moisture management criteria:
  - When the building is being mechanically cooled, ventilation air shall be dried to a dew point value below the building's dew point.

- Condensation inside HVAC components and air distribution ductwork shall be drained to an appropriate sanitary drain or condensate collection system.
- Indoor surfaces of both occupied and unoccupied spaces shall not be cooled to temperatures so low as to create an average surface relative humidity (RH) of over 80 percent that lasts for more than 30 days on visible surfaces in occupied spaces and surfaces inside building cavities and unconditioned space.
- Indoor dew point shall be low enough to ensure no condensation occurs on the exposed surfaces of cool HVAC components or on building materials or furnishings.
- Humidifiers shall be sized, installed, and controlled so they do not overload the air with humidity, which increases the risk of condensation inside air distribution systems and exterior walls and roofing assemblies.

Rationale:
Damp indoor environments can increase the presence of biological agents such as mold, dust mites, and bacteria. These environments may also attract pests and cause building materials to deteriorate. Exposure to allergens can trigger allergic symptoms such as rhinitis, conjunctivitis, eczema, cough, and wheeze. For a sensitized person, repeated exposure can lead to asthma, and it appears that the severity of the asthma intensifies with increasing humidity, house dust mite, and mold levels. There is an association between dampness and upper respiratory tract symptoms, cough, wheeze, and asthma symptoms in sensitized persons. In addition there is limited or suggestive evidence that damp indoor environments are associated with dyspnea, lower respiratory illness in children, and asthma development.

Some fungi, particularly when in very high concentrations, can also colonize the airways of susceptible individuals, particularly asthmatics. Toxins from some molds (mycotoxins) can cause nausea and diarrhea, can suppress the immune system, and have been implicated in cases of pulmonary hemorrhage.

References:

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6.2. Solid Waste.

Requirement:
Every dwelling shall have adequate facilities for temporary storage of trash and recyclable materials.

6.2.1. There shall be trash containers outside the dwelling for the storage of trash awaiting collection or disposal. The total capacity of these facilities shall be sufficient to store occupants' trash between scheduled collection times, and shall be placed on a cleanable surface constructed to minimize spillage.

6.2.2. There shall be containers outside the dwelling for recyclable materials awaiting collection, with capacity sufficient to store occupants' recyclable materials between scheduled collection times.

Stretch Provision:
- Exterior trash and recycling containers shall be placed at least 30 feet (nine meters) from the building, unless such space is not available.

Rationale:
In 2010, Americans generated about 250 million tons of trash and recycled and composted over 85 million tons of this material, equivalent to a 34.1 percent recycling rate. On average, we recycled and composted 1.51 pounds of our individual waste generation of 4.43 pounds per person per day. The risk that poorly stored or accumulated solid waste poses to health is difficult to quantify as little epidemiological work in this area has been reported recently. The potential health outcomes may include gastrointestinal disease (from spread of infection) and asthma and allergic rhinitis (from allergens). Household waste may, in addition, present a physical hazard of cuts to young children. Emotional distress is also commonly associated with pest infestations and accumulations of solid waste. Establishing solid waste collection, storage, and disposal provisions helps reduce pest infestations, the growth and spread of biological agents, odor emissions, and windblown litter.

References:

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- U.S. Environmental Protection Agency. (n.d.). Municipal solid waste. http://www.epa.gov/epawaste/nonhaz/municipal/index.htm

6.3. Pest Management.

Requirement:
Integrated pest management (IPM) methods shall be used to maintain every dwelling free of infestation, openings that allow pest entry, conditions that harbor pests or provide them with food or water, and visible pest residue or debris.

6.3.1. A pest management professional who has an IPM certification or a person trained in IPM shall develop the IPM program for a multifamily building.

6.3.2. Every dwelling, premise, accessory structure, and fence shall be maintained in good repair, free of pest infestation, and inspected for pests and building conditions that attract and support pests.

6.3.2.1. There shall be no accumulation of trash, paper, boxes, lumber, scrap metal, food, or other materials that support rodent harborage in or about any dwelling or premises. Stored materials shall be placed in boxes or stacked in stable piles elevated at least six inches (152 mm) above the ground or floor and at least six inches (152 mm) from the walls. Stored materials shall not block any egress routes.

6.3.2.2. There shall be no trees, shrubs, or other plantings in the soil within six inches (152 mm) of any dwelling.

6.3.2.3. There shall be no accumulation of water in or about any dwelling or premises.

6.3.3. Every openable window and storm door shall be supplied with adequate screens to prevent the entry of pests.

6.3.4. There shall be no holes or open joints in exterior walls, foundations, slabs, floors, or roofs that equal or exceed one-eighth inch (3 mm).

6.3.4.1. The areas surrounding windows, doors, pipes, drains, wires, conduits, vents, and other openings that penetrate exterior walls shall be sealed with low-VOC caulk or closed cell insulation.

6.3.5. Pest infestation and the underlying cause shall be eliminated using control methods consistent with IPM, such as exclusion, sanitation, and least-risk pesticides scaled to and designed for the targeted infestation.

6.3.5.1. Foggers and organic phosphates shall not be used to control or eliminate pests.

Rationale:
Poorly stored food waste will attract pests. These pests may then come into contact with food before it is prepared or eaten or may come into direct contact with persons. Rodents have long been linked to property destruction and disease. Rodents are known to be infected with pathogenic organisms, including zoonotic agents such as *Yersinia entercolitica* (Yersiniosis), *Listeria spp* (Listeriosis), *Cryptosporidium parvum* (Cryptosporidiosis), *Toxoplasmagondii* (Toxoplasmosis), *Leptospira spp* (Leptospiral Jaundice or Weil's disease), *Trichinella spiralis,* and *Trichuris spp* (Whipworm infection). Proper food storage, rat-proofing construction, and ensuring good sanitation outside the home have served to eliminate or reduce rodent problems in the 21st century home.

Children who live in dwellings infested with cockroaches show high levels of sensitivity to cockroach allergen. Contact with cockroaches can cause dermatitis, uticaria, rhinitis, bronchitis, and asthma. Some people have an aversion to insects amounting to a phobia and can suffer anxiety when in the presence of the insects. Bed bugs are pests of significant public health importance, as are mosquitoes, fleas, and other insects.

Integrated pest management (IPM) is the best way to prevent and eliminate pests while preventing unnecessary occupant inhalation and ingestion of poisonous pesticide chemicals. Total release foggers are ineffective as methods in controlling most pests, often counteract less toxic strategies, and can result in resident exposure to toxic chemical agents, and if misused can cause fires, other destruction of property, and loss of life.

Certified pest management professionals (PMPs) with knowledge and experience of IPM, and other individuals trained in IPM, can be critical resources for buildings owners and managers.

References:

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- U.S. Environmental Protection Agency. (n.d.). Pesticides: Controlling pests: Controlling rodents. Retrieved from http://www.epa.gov/pesticides/controlling/rodents.htm

Resources:

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- New York City Department of Health and Mental Hygiene. (2008, April). *Preventing rats on your property: A guide for property owners and tenants.* (EHS Publication No. EHS6356051 - 4.08). New York: Author. Retrieved from http://www.nyc.gov/html/doh/downloads/pdf/pest/rodent_control.pdf
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- U.S. Department of Housing and Urban Development. (2011, April 26). Promotion of integrated pest management (IPM) as an environmentally-sound, economical and effective means to address a major resident concern. (PIH Notice No. 2011-22). Retrieved from http://portal.hud.gov/hudportal/documents/huddoc?id=11-22pihn.doc

7. CHEMICAL AND RADIOLOGICAL AGENTS

7.1. General Requirements.

Requirement:
All chemical and radiological agents in dwellings, premises, and accessory structures, including but not limited to deteriorated lead-based paint, friable asbestos-containing material, formaldehyde, volatile organic compounds, radon, pesticides, and methamphetamine, shall be contained, stored, removed, or mitigated in a safe and healthy manner consistent with federal, state, and local laws and regulations. When an applicable regulatory limit is more protective than the level included in this section, the more restrictive limit shall apply.

7.2. Lead-Based Paint.

Requirement:

7.2.1. Lead levels at or above federal regulatory limits pursuant to 40 C.F.R. § 745.65 are deemed hazardous: (1) lead-based paint on an existing painted surface—0.5 percent by weight or 1.0 milligrams per square centimeter; (2) dust on floors—40 micrograms of lead per square foot of settled dust (µg/ft^2); (3) dust on interior window sills—250 µg/ft^2; (4) dust on window troughs (wells)—400 µg/ft^2; (5) bare soil in children's play areas—400 parts per million (ppm) of lead; and (6) bare soil in areas of the yard that are not children's play areas—1,200 ppm.

7.2.2. Painted surfaces shall be maintained intact. With the exception of paint that is tested and found not to contain lead-based paint in accordance with 40 C.F.R. § 745.82(a), deteriorated paint at a property built before 1978 shall be repaired in accordance with the renovation requirements of 40 C.F.R. § 745 Subpart E, and the underlying cause of the deterioration shall be corrected.

7.2.3. All renovation, repair, and painting work that disturbs a painted surface in a pre-1978 dwelling shall be performed in accordance with the renovation requirements of 40 C.F.R. § 745, Subpart E, unless the paint has been tested and found not to contain lead-based paint in accordance with 40 C.F.R. § 745.82(a). Dust clearance testing shall be performed at the conclusion of renovation work.

7.2.4. With the exception of paint that is tested and found not to contain lead-based paint in accordance with 40 C.F.R. § 745.82(a), a painted surface shall not be disturbed using methods that involve (1) open-flame burning or torching or operating a heat gun at temperatures above a maximum of 1,100° F (593° C); or (2) power sanding, grinding, power planing, needle gun, abrasive blasting, or sandblasting unless such machines have shrouds or containment systems and a High-Efficiency Particulate Air (HEPA) vacuum attachment that collects dust and debris at the point of generation. The shroud or containment system shall release no visible dust or air outside the shroud or containment system.

7.2.5. Lead-based paint shall not be applied to the interior or exterior surface of any dwelling or dwelling unit.

Stretch Provision:

- Lead present at or above the following limits is deemed hazardous: (1) lead-based paint on a friction, impact, or chewable surface, damaged or otherwise deteriorated, or non-intact—0.06 percent by weight; (2) dust on floors—10 micrograms of lead per square foot of settled dust (µg/ft^2); (3) dust on interior window sills—100 µg/ft^2; and (4) 40 µg/ft^2 on porches.

Rationale:
Lead is a heavy metal that accumulates in the body when ingested and has toxic effects on the nervous system, cognitive development, and blood-forming systems and numerous other systems production. Sources of lead include lead-based paint and the dust it generates, soil, drinking water, and consumer and other products. Lead-contaminated soil may be found particularly around older buildings contaminated by flaking external paintwork, adjacent to industrial premises using (or previously having used) lead, and near busy roads from the exhaust fumes from leaded gasoline. Lead is readily absorbed from the intestinal tract, especially in children, and its absorption is enhanced by dietary deficiency of iron and calcium.

Even with relatively low levels of lead in blood, studies show effects on a child's nervous and other systems. The highest risk group is young children aged 0-5 years, because of lead's potential effect on neurological development

and because physiologically they take up lead more readily. Pregnant women and their babies are at risk since lead can pass through the placental barrier.

References:

- Dixon, S. L., Gaitens, J. M., Jacobs, D. E., Strauss, W., Nagaraja, J., Pivetz, T., Wilson, J. W., & Ashley P. J. (2009, March). Exposure of U.S. children to residential dust lead, 1999–2004: II. The contribution of lead-contaminated dust to children's blood lead levels. *Environmental Health Perspectives, 117*(3): 468–474. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/19337524
- Gaitens, J. M., Dixon, S. L., Jacobs, D. E., Nagaraja, J., Strauss, W., Wilson, J. W., & Ashley, P. J. (2009, March). Exposure of U.S. children to residential dust lead, 1999–2004: I. Housing and demographic factors. *Environmental Health Perspectives, 117*(3): 461–467. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2661918/
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- National Center for Healthy Housing et al. (2009). Communication to the Environmental Protection Agency. Retrieved from http://www.nchh.org/Portals/0/Contents/EPA_Lead_Standards_Petition_Final.pdf
- Residential Property Renovation, 40 C.F.R. § 745 Subpart E (2008).

7.3. Asbestos.

Requirement:

Every owner shall maintain in good repair all asbestos-containing material on the premises. All asbestos-containing material shall be maintained non-friable and free from any defects such as holes, cracks, tears, and/or looseness that may allow the release of fibers into the environment.

7.3.1. Friable asbestos-containing material shall be abated by licensed asbestos professionals in accordance with federal, state, or local requirements.

7.3.2. Any renovation, demolition, or other activity that will disturb asbestos-containing materials shall be preceded by asbestos abatement performed by certified asbestos professionals in accordance with federal, state, or local requirements.

7.3.3. Abatement, removal, and disposal of all asbestos-containing material shall comply with all appropriate federal, state, and local requirements.

Rationale:

Exposure to asbestos increases the risk of developing lung disease. Disease symptoms may take many years to develop following exposure. Asbestos products were historically used extensively in building materials. Vermiculite insulation in homes may be contaminated with asbestos. A mine near Libby, Montana was the source of over 70 percent of all vermiculite sold in the United States from 1919 to 1990. There was also a deposit of asbestos at that mine, so the vermiculite from Libby was contaminated with asbestos. Vermiculite from Libby was used in the majority of vermiculite insulation in the United States and was often sold under the brand name Zonolite. Vermiculite insulation should be assumed to be contaminated with asbestos and should not be disturbed. Trained professionals must be hired to remove vermiculite insulation. Many asbestos-containing materials continue to be legal to sell and to use. Intact asbestos is not a hazard; it becomes a hazard when it is damaged or deteriorated and releases friable asbestos. The EPA and most states certify or license asbestos inspectors.

References:

- Agency for Toxic Substances and Disease Registry. (2001). *Public health statement for asbestos*. Atlanta, GA: U.S. Department of Health and Human Services. Retrieved from: http://www.atsdr.cdc.gov/toxprofiles/phs61.html
- Asbestos National Emissions Standards for Hazardous Air Pollutants. 40 C.F.R. §§ 61.140-157 (1971).
- U.S. Centers for Disease Control and Prevention & U.S. Department of Housing and Urban Development. (2006). *Healthy housing reference manual*. Retrieved from www.cdc.gov/nceh/publications/books/housing/housing.htm.
- U.S. Environmental Protection Agency. (n.d.). Protect your family from asbestos-contaminated vermiculite insulation. http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation

7.4. Toxic Substances in Manufactured Building Materials

Requirement:

7.4.1. Building materials consisting of hardwood plywood, medium-density fiberboard, and particleboard as defined by 15 U.S.C. 2697(b)(2) shall not be used in maintenance and renovations within dwellings, unless the materials have been certified to meet the formaldehyde emission standards of 15 U.S.C. 2697(b)(2):

(1) Hardwood plywood with a veneer core, 0.05 parts per million (ppm);

(2) Hardwood plywood with a composite core, 0.05 ppm;

(3) Medium-density fiberboard, 0.09 ppm;

(4) Thin medium-density fiberboard, 0.11 ppm; and

(5) Particleboard, 0.08 ppm.

7.4.2. Building materials used in maintenance and renovations, including but not limited to paints, coatings, primers, glues, resins, adhesives, and floor coverings, shall be certified as having no volatile organic chemicals (VOCs) or low VOC emissions, and having no halogenated flame retardants (HFRs).

Rationale:

Formaldehyde is a prominent VOC found in household and construction products. It is a colorless, strong-smelling gas that can cause watery eyes; burning sensations in the eyes, nose, and throat; nausea; coughing; chest tightness; wheezing; skin rashes; and allergic reactions. Laboratory animal studies have revealed that formaldehyde can cause cancer in animals. Formaldehyde is classified by the World Health Organization as a known human carcinogen. The most significant source of formaldehyde in homes has been pressed wood products made using adhesives that contain urea formaldehyde (UF) resins. These products include particleboard (used as subflooring and shelving and in cabinetry and furniture), hardwood plywood paneling (used for decorative wall covering and used in cabinets and furniture), and medium-density fiberboard (used for drawer fronts, cabinets, and furniture tops). Medium-density fiberboard contains a higher resin-to-wood ratio than any other UF pressed wood product and is generally recognized as being the highest formaldehyde-emitting pressed wood product.

Pending EPA regulations will implement the Formaldehyde Standards for Composite Wood Products Act to limit formaldehyde emissions from composite wood products and finished goods that contain composite wood products in the U.S. The World Health Organizations has recommended a short-term (30-minute) indoor formaldehyde exposure guideline of 0.1 mg/m^3 to prevent sensory irritation in the general population.

Interior paints and primers, glues, and adhesives may release VOCs, particularly when drying. Exposure to individual VOCs and mixtures of VOCs can cause or aggravate health conditions, including allergies, asthma, and irritation of the eyes, nose, and airways; however, no health-based standards for indoor non-occupational exposure have been set.

Halogenated flame retardants (HFRs) used in fabrics, foams, and various plastics disrupt thyroid and estrogen hormones, which can cause developmental effects, such as permanent changes to the brain and to reproductive systems (including reduced sperm count in males and changes to ovarian cell structure in females).

References:

- Enterprise Communities Partners. (2011). *Enterprise green communities criteria.* Retrieved from http://www.enterprisecommunity.com/servlet/servlet.FileDownload?file=00Pa000000FxwvNEAR
- Formaldehyde Emission Controls for Certain Wood Products. 24 C.F.R. § 3280.308. (1984).
- Formaldehyde Standards for Composite Wood Products Act. 15 U.S.C. § 2697. (2010).
- National Cancer Institute. (n.d.). Formaldehyde and cancer risk. Retrieved from http://www.cancer.gov/cancertopics/factsheet/Risk/formaldehyde
- National Toxicology Program. (2011, June). *Report on carcinogens, twelfth edition.* Department of Health and Human Services, Public Health Service. Retrieved from http://ntp.niehs.nih.gov/go/roc12
- Offerman, F. (2009, November). *Ventilation and indoor air quality in new homes.* California Air Resources Board and California Energy. Retrieved from http://www.arb.ca.gov/research/apr/past/04-310.pdf

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- U.S. Environmental Protection Agency. (2013). *Formaldehyde emissions from composite wood products*. Retrieved from http://www.epa.gov/oppt/chemtest/formaldehyde/
- World Health Organization Regional Office for Europe. (2010). *WHO guidelines for indoor air quality: Selected pollutants*. Copenhagen: Author. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0009/128169/e94535.pdf

Resources:

- Collaborative for High Performance Schools. (n.d.). High performance products database. Retrieved from http://www.chps.net/dev/Drupal/node/445
- Underwriters Laboratories. (n.d.). Greenguard certification from UL Environment: Healthier schools. Retrieved from http://greenguard.org/en/HealthierSchools.aspx
- Green Seal. (n.d.). Find green products and services. Retrieved from http://www.greenseal.org/FindGreenSealProductsAndServices.aspx
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- Master Painters Institute. (2010, January). MPI introduces "Extreme Green™" paint standard. Retrieved from http://www.paintinfo.com/MPInews/ExtremeGreen_Jan2010.shtml
- Scientific Certification Systems. (2007, May). *SCS - EC10.2 -2007: Environmental certification program: Indoor air quality performance*. Retrieved from http://www.scscertified.com/docs/SCS-EC10.2-2007.pdf

7.5. Radon.

Requirement:

Radon present at levels at or above the EPA action level of four picocuries radon per liter of air (pCi/L) in the lowest habitable level of the dwelling shall be deemed hazardous. Radon levels shall be determined by an approved testing method in accordance with state and local requirements. Radon levels exceeding four pCi/L shall be mitigated by a qualified radon mitigation professional who meets state and local requirements. If there are no state or local requirements qualifying radon testing and mitigation professionals, radon testing and mitigation shall be performed by a professional certified by a national private-sector radon proficiency program.

Stretch Provision:

- Radon present at levels at or above two pCi/L in the lowest habitable level of the dwelling shall be deemed hazardous. Radon determined by an approved testing method to exceed two pCi/L shall be mitigated by qualified radon mitigation professionals in accordance with state and local requirements. If there are no state or local requirements qualifying radon testing and mitigation professionals, radon testing and mitigation shall be performed by a professional certified by a national private-sector radon proficiency program.

Rationale:

The U.S. Environmental Protection Agency (EPA) estimates that about 21,000 lung cancer deaths each year in the U.S. are radon-related. Exposure to radon is the second-leading cause of lung cancer after smoking. Radon is an odorless, tasteless, and invisible gas produced by the decay of naturally occurring uranium in soil and water. Radon decays rapidly and the resulting products quickly attach themselves to particles in the air. If these particles are inhaled, they can be deposited in the lungs, where the process of radioactive decay continues. The particles emitted can cause cells lining the lungs to mutate genetically and initiate cancer or facilitate a process already initiated by other carcinogens. The risk related to radon increases with dose and duration of exposure. The highest risk is for smokers. As radon is soluble in water, it can be ingested, resulting in the organs of the gastrointestinal

tract receiving the largest dose. EPA has established a recommended maximum exposure level of four pCi/L in occupied areas. Approximately one in 15 homes nationwide has radon above this level.

References:

- American Association of Radon Scientists and Technologists, Inc. (n.d.). National radon proficiency program. Retrieved from http://nrpp.info/
- American Association of Radon Scientists and Technologists, Inc. (2012). *ANSI-AARST standard: Protocol for conducting radon and radon decay product measurements in multifamily buildings (MAMF-2012)*. Retrieved from http://www.aarst.org/standards/messages/296/AARST_MAMF_DraftClean_06-09opt-2127.pdf
- National Radon Safety Board. (n.d.). Certified radon professionals. http://www.nrsb.org/find_a_professional.asp
- U.S. Department of Health and Human Services Press Office. (2005, January 13). Surgeon General releases national health advisory on radon. [Press release.] Retrieved from http://www.surgeongeneral.gov/news/2005/01/sg01132005.html
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- U.S. Environmental Protection Agency. (2013). Radon (Rn). Retrieved from http://www.epa.gov/radon/index.html
- U.S. Environmental Protection Agency. (2013). Radon (Rn): Where you live. Retrieved from http://www.epa.gov/radon/whereyoulive.html

7.6. Pesticides.

Requirement:
Pesticides shall only be used in accordance with IPM methods discussed in Section 6.3, using the least toxic pesticide with demonstrated efficacy for the identified pest.

7.6.1. Pesticides shall be applied only in areas and at concentrations which comply with manufacturer specifications. When it is determined by an approved method that a hazardous amount of a pesticide has been applied in a location or at a concentration contrary to manufacturer specifications, the hazard shall be immediately mitigated.

7.6.2. Pesticides shall be stored and disposed in accordance with manufacturer specifications.

Rationale:
The health effects of pesticides vary with the product, but most products affect the eyes, noses, and throats. More severe consequences, such as central nervous system and kidney damage and increased cancer risk, are possible. An EPA survey revealed that bathrooms and kitchens are areas in the home most likely to have improperly stored pesticides. In the United States, EPA regulates pesticides under the pesticide law known as the Federal Insecticide, Fungicide, and Rodenticide Act. Since 1981, this law has required most residential-use pesticides to bear a signal word, such as "danger" or "warning," and to be contained in child-resistant packaging. This type of packaging is designed to prevent or delay access by most children under the age of five years.

References:

- National Pesticide Information Center. (n.d.). www.npic.orst.edu.
- U.S. Environmental Protection Agency. (n.d.). An introduction to indoor air quality (IAQ): Pesticides. Retrieved from http://www.epa.gov/iaq/pesticid.html

7.7. Methamphetamine.

Requirement:
A dwelling that has been used for methamphetamine manufacture shall be vacated until certified by an approved testing method as safe from hazardous materials related to the methamphetamine manufacturing process.

Rationale:
Homes formerly used as methamphetamine labs put residents, especially children, at serious health risk. Methamphetamine can be inhaled or absorbed through the skin. Effects resulting from acute exposures include cough; headache; chest pain; burns to skin, eyes, nose, and mouth; shortness of breath; dizziness; pulmonary edema; coma; and death. Exposure over a longer period can lead to liver and kidney damage, neurological problems, and an increased risk of cancer.

References:

- American Academy of Pediatrics Council on Environmental Health. (2012). Drug (methamphetamine) laboratories. In R. A. Etzel (Ed.), *Pediatric Environmental Health, 3rd edition*. (pp. 737–748). Elk Grove Village, IL: American Academy of Pediatrics.
- Minnesota Department of Health. (2013). Methamphetamine and meth labs: What are the potential health effects from exposure to a meth lab? Retrieved from http://www.health.state.mn.us/divs/eh/meth/lab/potenteffects.html
- U.S. Centers for Disease Control and Prevention. (2000, November 17). Public health consequences among first responders to emergency events associated with illicit methamphetamine laboratories—Selected states, 1996–1999. Morbidity and Mortality Weekly Report *49*(45) (CDC Publication No. 2001-633-173/48011 Region IV). Washington, DC: U.S. Government Printing Office. Retrieved from http://www.atsdr.cdc.gov/hs/hsees/Horton_MethLabs.pdf

7.8. Smoke in Multifamily Housing.

Requirements:

7.8.1. Smoking shall be prohibited in all indoor common areas of multifamily buildings.

7.8.2. Smoking shall be prohibited in exterior areas less than 25 feet (762 cm) from building entrances, outdoor air intakes, and operable windows.

7.8.3. Tenants and prospective tenants shall be informed in writing of any applicable smoke-free policy and the location of designated smoke-free and smoking areas. Signs shall be posted in all designated areas.

7.8.4. Tenants who terminate a lease early due to incursion of tobacco smoke or the inception of a smoke-free policy shall be exempt from early termination penalties or security deposit forfeiture.

Stretch Provisions:

- A property-wide policy shall be established in consultation with current tenants to designate exterior common areas where smoking shall be prohibited and areas where smoking shall be permitted.
- A property-wide policy shall be established in consultation with current tenants to designate dwelling units where tobacco smoking shall be prohibited.

Rationale:
Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and approximately 70 carcinogens, such as arsenic, formaldehyde, benzene, and vinyl chloride. After smoking and radon, secondhand smoke exposure is the third-leading cause of lung cancer death. Secondhand smoke (SHS) also causes numerous health problems in infants and children, including asthma attacks, respiratory infections, ear infections, and sudden infant death syndrome (SIDS). In addition, tobacco smoking is the leading cause of fatal residential fires in the U.S. The U.S. Surgeon General has concluded that there is no safe level of exposure to SHS. Also, experts have concluded that the only way to effectively prevent the migration of SHS from the units of smokers to common areas and the units of nonsmokers is to prohibit all smoking within the building. A study in the United Arab Emirates found that incense smoke emits carbon monoxide, oxides of nitrogen, formaldehyde and carbonyls, and that incense smoke exposure causes significant lung cell inflammation. Studies show that thirdhand smoke clings to hair, skin, clothes, furniture, drapes, walls, bedding, carpets, dust, vehicles, and other surfaces, even long after smoking has stopped. Infants, children, and nonsmoking adults may be at risk of tobacco-related health problems when they inhale, ingest, or touch substances containing thirdhand smoke. Thirdhand smoke is a relatively new concept, and researchers are still studying its possible dangers.

References:

- American Cancer Society. (n.d.). Secondhand smoke. Retrieved from http://www.cancer.org/cancer/cancercauses/tobaccocancer/secondhand-smoke
- American Society of Heating, Refrigerating, and Air-Conditioning Engineers. (2013). ASHRAE position document on environmental tobacco smoke . Retrieved from https://www.ashrae.org/File%20Library/docLib/About%20Us/PositionDocuments/ASHRAE_PD_Environmental_Tobacco_Smoke_2013.pdf
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