National Healthy Housing Standard: Implementation Tool

User Group Legend	Developers		Property Managers		Maintenance	

Priority	Highest				Lower

Section Number	2013 National Healthy Housing Standard	Who	Rationale	Tools/Resources
1.1 Duties of Owners	The owner ensures that the structure, dwelling unit, common area, and premises are maintained in safe and healthy condition. • Provide accessible trash and recycling containers and disposal. • Pest free – Integrated Pest Management (IPM) • Advanced notification of use of chemicals (pesticides, herbicides, etc.). • Provision of services: water, sewer, electrical, gas, etc. • Timely repairs.		• The owner has a duty to ensure that the premises are maintained in a safe and healthy condition. • Provide a guide for occupants that explains policies and procedures, as well as the intent, benefits, use, and maintenance of the home's features and practices. • Prompt attention to resident complaints can save money and time on deferred maintenance. • Trash and recycling containers should have tightly-sealed lids, be in good repair, and be emptied routinely to discourage pests and unsanitary conditions.	**For Property Managers:** • To find out whether the IPMC or any of the other ICC Codes have been adopted in your community, go here. • Check with your code department for local housing, habitability and maintenance codes that may apply. • For guidance on producing a resident manual, see Enterprise Green Communities resident engagement tools, trainings and sample manuals. Search for "Resident Engagement" here. • See IPM Guidance in Section 6.3. • Provide residents with local information for handling household hazardous waste, including compact fluorescent bulbs (CFLs). • To keep tenants informed on ways to recycle waste materials, especially hazardous items, the following sites provide content that could be built into printed materials or email blasts to tenants: - EPA resources and advice on recycling here. - Earth 911 has good resources on recycling including recycling guides for different categories of materials such as standard items and hazardous waste here. **For Maintenance:** • Address maintenance issues promptly. • Regularly survey condition of trash and recycling containers.
1.2 Duties of Occupants	The occupant will properly use and operate the dwelling unit and owner-supplied fixtures and facilities in safe and healthy manner. Occupant will also be responsible for reporting unsafe and unhealthy conditions in a timely fashion. • Handling of trash and recyclables • Cooperation re: Pest free and IPM • Quick attention to and notification of water and excessive moisture issues		• Occupants share responsibility for maintaining a clean, safe and healthy environment, and to report unsafe or unhealthy conditions to management in a timely manner. • Clear policies and procedures for reporting maintenance issues will help management address complaints before they become bigger problems. • Include and enforce lease provisions related to housekeeping and notification of maintenance issues.	**For Property Managers:** • IPMC 301.2 Responsibility: Occupants of a dwelling unit, rooming unit, or housekeeping unit are responsible for keeping in a clean, sanitary, and safe condition that part of the dwelling unit, rooming unit, housekeeping unit, or premises which they occupy and control. • Resource for key statutes pertaining to landlord-tenant law in each state here. • For sample lease language, see HUD Sample Public Housing Authority Lease Agreement Terms and Conditions, look here.

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			• Resident training and education are key to success. Engage residents at regular intervals (e.g., move-in, 3 months, 1 year, then annually) that coincide with existing tenant engagement to check in on behaviors and the potential need for assistance.	
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, capable of supporting design loads and load effects and be in good condition.		• The structure is dependent on foundation and footing, vapor retarders, framing, roofs, exterior walls, and trim components that are maintained in good condition. • Poor construction can result in moisture issues, poor energy efficiency, excessive noise, structural damage, pest intrusion, and collapse of building components, leading to poor health, injuries, or even death.	**For All:** • The Code Check Series are condensed guides to the most commonly cited code violations encountered by building inspectors, contractors, do-it-yourselfers and homeowners. Each edition of Code Check is based on specific sets of codes, and most books include summaries of code changes to link them to the prior edition of codes as well. Link to Code Check guides here. **For Property Managers and Maintenance:** • Checklists for common Inspections: HUD's UPCS inspection checklist here. • Link to HUD training for UPCS, inspection videos, etc., here. • Safety glazing: here. • Include structural check-ups as part of regular inspections. • Make note of issues beyond your scope and bring to the attention of management.
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. • No mechanical, utility and heating equipment in habitable rooms • Multifamily equipment rooms shall be locked		• Too much carbon monoxide in the blood can kill. • Low-level exposures also endanger health. • Regular chimney system inspection and maintenance can prevent poisoning incidents.	**For Developers:** • The Code Check Series are condensed guides to the most commonly cited code violations encountered by building inspectors, contractors, do-it-yourselfers and homeowners. Each edition of Code Check is based on specific sets of codes, and most books include summaries of code changes to link them to the prior edition of codes as well. Link to Code Check here. **For Maintenance:** • Guide to chimney inspection and maintenance here. • For a guide to CAZ testing see: RESNET Interim Guidelines for Combustion Appliance Testing and Writing Work Scope.
2.3 Plumbing Systems	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. Approved potable water supply system shall: • Provide an adequate amount of running water under pressure to all fixtures simultaneously.		• Tap water scalds can cause injuries and death, particularly to the elderly and children under the age of five • Reducing water temperature can prevent accidents, conserve energy and save money.	**For All:** • The Burn Foundation guidance on hot tap water and scald burns here. **For Developers:** • Code Check link to plumbing and mechanical is here. • Consumer Product Safety Commission safety alert offers guidance here. **For Maintenance:**

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	• Hot water supplies shall be set at a minimum temperature of 110° F and a maximum of 120° F. - water discharged from tankless water heater not to exceed 140° F. • Waste pipes shall be connected to sewer system with clean-outs, no toilets connecting to grey-water systems • Faucet discharges located above the overflow rim of sinks and other fixtures.		• Plumbing leaks may cause mold growth on building materials, exposing people to respiratory diseases and biological contaminants. • The containment of household sewage is instrumental in protecting the public from waterborne and vector-borne diseases.	• Testing tap water: Let hot water run for three to five minutes. Test the temperature at the tap with a candy, meat, or water thermometer.
2.3 Plumbing Stretch	• Bathtub and shower faucets shall have anti-scald devices. • 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. • 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.		• Scalding accidents occur most frequently in the bathrooms and kitchens. Sinks and showers can be fitted with anti-scald protective devices for very little money, virtually eliminating these hot water injuries. • Metering individual units makes tenants aware of their resource use. • Water conservation translates into direct utility savings for residents and building owners, and lowers infrastructure costs associated with stormwater management and water treatment facilities. • Reduced water pressure saves water, conserves energy and helps ensure proper operation of fixtures and appliances. • People get Legionnaires' disease (a type of pneumonia) when they breathe in a mist or vapor (small droplets of water in the air) containing the bacteria. The bacteria grow best in warm water, like the kind found in hot tubs, cooling towers, hot water tanks, large plumbing systems, and decorative fountains. • A water quality indicator test measures the presence and amount	**For Developers:** • For more information and additional recommendations on metering and submetering, review the 2015 Enterprise Green Communities criteria (Category 4 water conservation), U.S. Green Building Council's LEED® rating system, and the 2015 International Green Construction Code. **For Developers and Property Managers:** • Anti-scald valves, also known as tempering valves and mixing valves, mix cold water in with outgoing hot water so that the hot water that leaves a fixture is not hot enough to scald a person. See article on anti-scald valves here. • The 2015 WEP: Water Efficiency Provisions of the International Green Construction Code (IgCC) is the most complete code resource on water conservation and efficiency. It includes water-related IgCC provisions to support jurisdictions facing critical water challenges and drought here. **For Property Managers**: • Industry guidance on legionellosis is available in a standard from ASHRAE here. • Who should test your well here. • State and local health or environmental departments often test for nitrates, total coliforms, fecal coliform, volatile organic compounds, and pH. • Health or environmental departments, or county governments should have a list of the state-certified (licensed) laboratories in your area that test for a variety of substances. • Visit one of the links below, contact your local health department, or the EPA Safe Drinking Water Hotline at 800-426-4791. - Well Water Information Based on Where You Live (United States Environmental Protection Agency) - State Certified Drinking Water Laboratories (United States Environmental Protection Agency)

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			of certain germs in water. They are easy to test for and their presence may indicate the presence of sewage and other disease-causing germs from human and/or animal feces. • Lead still can be found in some metal water taps, interior water pipes, or pipes connecting a house to the main water pipe in the street, as well as public service mains. • Consider a program to replace leaded components systematically.	• For more information on testing for lead in water, call EPA's Safe Drinking Water Hotline at 800-426-4791 or your local public health department here. • Please contact your state lead program (click here for a list) for information about water testing in your area. • For homes served by public water systems, data on lead in tap water may be available on the Internet or from your local water authority.
2.4 Kitchen	Every kitchen must be equipped with: • Functional sink with hot and cold water, sufficient counter for food preparation and cabinets for storage, range (oven and cooktop) with acceptable clearances to combustibles. • Refrigerator with 41° F maximum and 32° F. minimum temperature and freezer, or adequate connections for a tenant supplied refrigerator. • Sealed, water-resistant, non-absorbent and cleanable counter and floor surfaces. • Ventilation (see Subsection 5.3).		• Properly designed kitchens enable the safe and hygienic preparation and cooking of food and reduce the risk of food poisoning. • Written rehabilitation standards can help ensure that all renovations and replacements are consistent with the developer's standards • Improperly chilled refrigerators can lead to spoiling food, food-borne illnesses, and wasted energy. • Maintenance staff should regularly measure refrigerator temperatures. • Kitchen surfaces (especially floors and counters) that are impervious to water and easily cleaned and maintained prevent the accumulation of dirt, moisture, and biological agents.	**For Developers**: • For guidance on developing written rehabilitation standards, click here. • The NKBA Kitchen and Bathroom Planning Guidelines with Access Standards is a collection of illustrations and planning suggestions to aid professionals in the safe and effective planning of kitchens and bathrooms here. **For Property Managers and Maintenance:** • During any kitchen maintenance call, use a checklist to inspect for leaks, pests, caulk, and condition of countertops, cabinets, and floors. • Check appliances for operation. Use an appliance thermometer, and add temp measurements to maintenance checklists. • See the USDA's refrigeration and food safety checklist here.
2.4 Kitchen Stretch	• Cabinets and countertops shall be constructed of materials with low- or no-formaldehyde resins. • 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		• According to the CDC, formaldehyde irritates the airways, causing sensitivity in some. It is known to cause cancer. • Wall surface: HUD suggests stainless steel grease splash. Ceramic tile may also be a good choice.	**For All:** • At unit turnovers, look for opportunities to add health and safety features. Specify and approve materials. Provide healthy materials purchasing resources for personnel. • HUD spec for cabinets, back splash here.

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	sealed or covered to permit thorough cleaning and deter pests. • Enclosed cabinets (as opposed to a shelves) sufficient to store occupants' food that does not require refrigeration. • Freestanding stoves shall have brackets to prevent tip-over.			• Look for cabinets with NAUF (no added urea formaldehyde). Armstrong offers a line here. • Always confirm the installation of anti-tip-over brackets on freestanding stoves.
2.5 Bathroom	Every unit has a private bathroom with functional toilet, sink, bathtub or shower (nonslip surfaces), cleanable, non-absorbent, and water-tight floor surface and wall surface, and ventilation per Subsection 5.3.		• Poorly maintained bathrooms can cause water damage, mold growth, and associated health issues. Use cleanable, non-skid finishes.	**For Developers:** • The NKBA Kitchen and Bathroom Planning Guidelines with Access Standards is a collection of illustrations and planning suggestions to aid professionals in the safe and effective planning of kitchens and bathrooms here. **For Developers and Maintenance:** • Consider the addition of blocking for grab bars whenever wall finishes are removed. • Suggested safest bathroom flooring here.
2.5 Bathroom Stretch	• Grab bars shall be firmly anchored to the wall adjacent to each bathtub, shower, and toilet. • 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 (not paper-faced wallboard). Monolithic tub and shower enclosures (e.g., fiberglass with no seams) are exempt.		• Outcomes from a bathroom fall are likely to be more severe than in other areas, and older adults experience greater injuries. • Deficiencies in the bathroom, such as the lack of grab bars and nonslip surfaces, may lead to falls.	**For Maintenance:** • For guidelines on the installation of grab bars, see the 2010 ADA standards for Accessible Design here. • See notes on wall finishes under 6.1 Moisture Stretch. **For Developers:** • For simplified instructions on various ADA bathroom guidelines see adabathroom.com's webpage here.
2.6 Minimum Space	• Dwelling will provide privacy and adequate space for sleeping and living. • Every habitable room will have minimum floor area of 70 square feet, and a minimum 84" ceiling height. • Available closet space. • Bedroom cannot be only access point to shared bath. • Bathroom cannot be only passageway to other spaces. • A partially or totally below grade room must have a window (Sect. 4.3) and Ventilation (Sect. 5.3). Walls and floors shall be waterproof and free of dampness.		• Personal space and privacy needs are important for household members. • Providing adequate enclosed floor space for living, sleeping, cooking, eating and storage helps prevent clutter and provides privacy to promote healthy living. • Clutter may result in pest harborage, psychological distress, and injury hazards.	**For Developers**: • Designers should be aware of additional local or funder design standards for habitable spaces. • Adequate storage areas help to prevent clutter. Consider coat closets and shoe storage near entry door, particularly in family units.

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2.7 Floors and Floor Coverings	Floors and floor coverings shall be attached at each threshold, maintained, cleanable and free of bulges or buckling.		• Worn flooring that is poorly maintained can pose slip, trip, and fall hazards.	**For Developers:** • Safest bathroom flooring article here. **For Maintenance:** • Check floors for signs of wear and loose transitions, seams, etc. Make repairs promptly.
2.7 Floors Stretch	• Floor coverings shall consist of low-pile carpet or nonabsorbent material such as hardwood, tile, or resilient flooring. Floor coverings and related adhesives, padding, etc., shall be certified as having low/no volatile organic compound (VOC) emissions, and no perfluorocarbons or halogenated flame retardants. • Walk-off entry mats shall be provided inside or outside each entryway that leads to the outdoors.		• Carpet may be a source of chemical and biological agents that cause illness. • VOC sources are flooring, glues, padding, and other materials used in installation. • Walk-off mats can keep dust, a source of pollutants, from entering the home.	**For Developers and Maintenance:** • Discontinue or limit the use of carpeting. Hard surface flooring has a longer life-cycle and lower cost than carpeting. Cleanable surfaces allow residents to remove dust and contaminants. • For laminate flooring, use the AC rating (wear rating). Click here for an explanation. • GreenSpec at Building Green is an excellent source for information on the environmental impact of product materials, including flooring, but there is a subscription cost. • If carpeting is required, use products tested by the Carpet and Rug Institute's (CRI) Indoor Air Quality testing program. See Green label carpet and padding products at www.carpet-rug.org. • Quality walk-off mats are available from Uline, Grainger. **For Maintenance:** • Use low-VOC material for repairs. • Clean and change out mats as needed.
2.8 Noise	• Interior noise level must be maintained below 45 dB L_{dn} (day-night equivalent sound level).		• The World Health Organization (WHO) has identified and documented seven categories of adverse health effects of noise pollution on humans. • Infants, children, those with mental or physical illnesses, and the elderly are particularly vulnerable to noise pollution.	**For Developers:** • Four general techniques for controlling noise in single- and multifamily structure are: elimination, absorption, sound barriers, and design. See HUD noise notebook here. • Detailed guidelines for determining allowable sound levels can be found in Chapter 47 of the ASHRAE Handbook — “Sound and Vibration Control.” • For tips, techniques and noise-reducing construction details, see CertainTeed Noise control brochure here. **For Maintenance:** • A sound level meter is used to measure sound pressure levels. • Sound level meters that measure 30-130 dB can be purchased from big-box stores beginning at $40.00 here through www.grainger.com or Extech • Evaluate noise levels while on-site equipment is operating • Ensuring appropriate operation of all moving and mechanical parts can reduce noise. Lubricate and maintain as needed.

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				• Seal penetration points and pathways.
2.8 Noise Stretch	• 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.		• Sealing noise penetration points may have multiple benefits beyond noise reduction. These can also be pathways for air and moisture intrusion, odors, pests and energy loss. • Insulating walls can reduce sound and energy loss.	**For All, see above section.**
3.1 Egress	• Every dwelling shall have at least two means of egress that serve as emergency escapes and rescue openings. • Egress shall lead outside without passing through another unit.		• Escape from fire is an important public safety protection. • Proper configuration of egress will prevent falls and physical injury, allow the timely evacuation of residents in an emergency; and permit entry by rescue workers wearing bulky emergency equipment.	**For Developers**: • Hold all dwellings to current IFC egress requirements, even if your jurisdiction allows "grandfathering" for rehabilitation projects. • Jeld-Wen offers an egress window calculator to meet all four IRC requirements here. **For Maintenance:** • *Popular Mechanics* offers a how-to for installing basement egress windows here.
3.2 Locks/ Security	• Mean of egress (windows and/or doors) shall have locks • Locks will be changed after each tenancy. • Unit entry doors require deadbolts with keyless operation from inside, and devices (entry door viewer, peephole) that permit the occupant to see outside entry door without fully opening. • Common exterior entry doors will have self-closing mechanisms and keyless operation from the inside.		• Inadequate home security may result in a fear of burglary or recurrence, stress caused by a burglary, and injuries caused to occupants by an intruder (aggravated burglary). • Keyless inside operation protects occupant safety in emergencies, and is required by most codes. • At minimum, install sash locks on all windows. Consider window locks on non-egress windows.	**For Developers and Property Managers:** • *Consumer Reports* locks buying guide here. • *This Old House* article, "All about Locks" here. • State Farm insurance "Choosing the Best Door Lock for Your Home" here. **For Maintenance:** • Locks are available for all window styles. See "Secure Your Windows" here. • To child-proof windows, see this. • Entry door viewers are available for less than $20 at big box stores. • How to install a peephole in a door here. • How to replace a peephole with a door viewer here. • How to install self-closing door hinges and mechanisms, see here.

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			• Remember that secure windows will keep children in as well as intruders out.	
3.3 Smoke Alarm	• Every unit shall have at least one smoke alarm outside each sleeping area and on each habitable floor. • Multifamily properties will have a tamper-proof smoke detection system (interconnected with central fire alarm) or stand-alone smoke alarms in good working condition, as allowed by local code. • Alternative visual notification shall be provided for hearing-impaired occupants.		• 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.	**For All:** • If your building officials permit the use of battery operated smoke alarms, consider alarms with permanent lithium ion batteries that provide a 10-year warranty of continuous use. They also provide a chirping alarm when the batteries have expired. • Smoke alarms should be replaced 10 years from the date of manufacture. To determine the age of your smoke alarm, look at the back for the date of manufacture. • ICC Building and Property Maintenance Codes and the NFPA 72 have requirements on interconnectivity of individual alarms, hard wiring, and placement. Local jurisdictions may have additional requirements. • Consider battery backup models if you have hard wired/ interconnected detectors. • For information on alarms for the hearing impaired, click here. **For Maintenance**: • For information on installing and maintaining smoke alarms see the NFPA webpage here.
3.3 Smoke Alarm Stretch	• 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.		• 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 rooms which often contain large pieces of furniture, such as sofas, chairs, mattresses and countertops, which burn slowly and create more smoldering smoke than flames.	**For All:** • Smoke alarms are available with two types of sensors, Photoelectric and Ionization. Photoelectric is best at sensing slow smoldering fires that place significant particulate in the air, and Ionization sensors are best at sensing fast burning fires with flames. Dual sensing alarms that include both photoelectric and ionization sensors are better overall. See NFPA page on Ionization versus Photoelectric here. • For a good overview of smoke and CO alarm types and functions, see the *Consumer Reports* webpage here.

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3.4 Fire Extin-guisher	• Each dwelling unit shall have at least one 10-pound fire extinguisher that is rated Class ABC in or near the kitchen. • 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.		• Kitchens are the leading area of origin for home structure fires. • When an extinguisher is used, it puts out the fire completely in half of the cases and minimizes the fire in almost one-quarter of the incidents.	**For All:** • Installation of fire extinguishers may lower cost of your insurance. • Consider installation of stove top/kitchen range hood fire suppression system, available for around $50. Find fire suppressor suppliers here. **For Maintenance:** • Inspect fire extinguishers regularly. Requirements may vary by your jurisdiction. For good tips on maintenance and testing of portable fire extinguishers, look here.
3.4 Fire Extin-guisher Stretch	• The dwelling shall have an automatic fire sprinkler system that complies with the applicable locally adopted fire code. In the absence of local requirements either the International Fire Code© or the National Fire Protection Association Standard 1 shall be followed.		• A fire sprinkler system's main value is its ability to quickly suppress a fire while it's still small. • Sprinklers can increase time to escape a burning home before being overcome by smoke inhalation. Children and the elderly are especially vulnerable under such circumstances. • Sprinklers can decrease the likelihood of serious injury to occupants or rescue workers. • With residential fire sprinklers installed, the fire can be extinguished or managed early on, preventing flashover and the need for firefighters to place themselves at risk.	**For Developers and Maintenance:** • Installation of sprinklers may lower cost of your insurance. • Sprinklers may be required in new construction or substantial rehab in some jurisdictions. • For NFPA resources, see here. • For information on home fire sprinklers, see the Home Fire Sprinkler Coalition here.
3.5 Carbon Monoxide Alarm	• At least one CO alarm will be outside each sleeping area and on each habitable floor. • Alternative visual notification shall be provided for hearing-impaired occupants.		• CO is a colorless, odorless, and extremely toxic gas. 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.	**For All:** • For a good overview of smoke and CO alarm types and functions, see the *Consumer Reports* webpage here. • Consider using CO alarms with lithium ion batteries and a 10-year warranty. • Consider using CO alarms with digital displays. • For information on alarms for the hearing impaired, click here.

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3.5 Carbon Monoxide Alarm Stretch	• CO alarms and combination smoke/CO alarms shall include voice notification. • CO alarm batteries shall be sealed-in and tamper-proof. • CO present at or above 30 ppm (35 mg/m3) when measured over one hour, or above nine ppm (10.5 mg/m3) measured over eight hours, shall be deemed hazardous and immediately addressed.		• At lower concentrations, CO may cause a range of symptoms from headaches, dizziness, weakness, nausea, confusion, and disorientation to fatigue. • 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.	**For Developers and Maintenance:** • CO alarms certified by UL must go off at no less than 70 ppm, but as little as 30 ppm may harm heart patients, pregnant women, and children. • Some CO alarms include a display that provides a ppm reading and can give you an indication of the actual CO level, and if it is increasing or is higher than usual. • Some also show the peak level since they were reset, alerting you to any spikes that have occurred. • CO alarms are available with permanent lithium ion batteries that provide a ten year warranty for continuous use. They also provide a chirping alarm when the batteries have expired. • A downloadable NFPA document on CO safety is available here.
3.6 Walking Surfaces	• Every stairway, ramp, deck, porch, and balcony shall be structurally sound and properly anchored. • Non-skid surfaces on stairs. • Continuous handrail installed not less than 34 inches and not more than 38 inches, measured vertically from above the nose of the tread.		• Inadequate handrails and railings on stairways, ramps, decks, porches, and balconies can result in slips, trips, and falls that cause physical injury. • 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.	**For Developers and Maintenance:** • Non-skid tapes and treads are available here. • Commercial-grade rubber and vinyl non-slip treads are available from many manufacturers. Roppe flooring and Armstrong and at some big-box stores. • Anti-slip treads (like these) can be applied to existing stairs. **For Maintenance:** • Information on installing non-slip stair treads here. • Be certain that handrails are present and secure.
3.6 Walking Surfaces Stretch	• Every interior and exterior stairway shall have uniform risers and treads. Risers shall be no higher than 7¾" and treads shall be at least 10". • Interior and exterior stairways shall have handrails on both sides. Railings shall have a graspable perimeter measuring 4"- 6". If non-circular, no sharp corners and a width no smaller than five-eighths of an inch.		• See above, 3.6 Walking Surfaces.	**For Developers:** • When rehabilitating existing buildings, take opportunities to redesign pre-existing stairs and handrails to meet current codes. • If there are children under age 5 in a house, a second rail can be installed about 24 inches above the treads.

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3.7 Guards	• Any structure located more than 30 inches (76.2 cm) above an adjacent area shall have a structurally sound guard between 30" and 42" high. • Window guards for windows more than 6' above grade and less than 3' from the interior floor. • Windows that serve as emergency egress will have ASTM F2090 compliant release hardware.		• Falls can result in physical injury, such as bruising, fractures and head, brain, and spinal injuries, as well as death. • 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. • After window guard requirements took effect in Boston and New York City, the incidence of falls by children from windows decreased 96% over 10 years. • A commercially available window guard designed to swing open to allow escape in the event of a fire costs as little as $20.	**For All:** • To help prevent injuries and tragedies, use window guards or window stops. • For windows on the 6th floor and below, install window guards that adults and older children can open easily in case of fire. • Use window guards that meet ASTM F2090 – 10, the Standard Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms. • For suggested products that meet the standard, look here.
3.8 Chemical Storage	• Each dwelling unit shall have storage space for medicine and chemical agents that is lockable or inaccessible to children. • 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.		• Many people store medicines unlocked and within reach of children. • Poison control centers answer more than 3.6 million calls each year, and children younger than six years old account for about half of the calls placed. • Flammable or combustible liquid, and gas contribute to fires.	**For All:** • Search online or any big-box store for "locking medicine cabinet home," beginning at $45. • The NFPA provides standards for the storage and control of flammable and combustible liquids at NFPA 30. • Lockable safety storage cabinets are available from Grainger and other suppliers.
3.9 Pools, Hot Tubs, and Other Water Features	• Unless safety cover complies with ASTM F 1346-91, all water features that hold water more than 24" in depth shall be completely surrounded by a fence or barrier at least 48" in height above the finished ground. Fence gate must be self-closing, self-latching. • Pool and spa drains shall have anti-entrapment covers on every suction outlet. • Adjacent electrical devices shall be GFCI protected.		• The majority of deaths and injuries in pools and spas involve children ages one to two and occur in residential settings. It takes only inches of water for a small child to drown. • Children can become entrapped and held under water by suction openings in broken, uncovered, or poorly covered drains.	**For All:** • Consumer Product Safety Commission's (CPSC) website here has free, downloadable information for the public, state, and local officials and the swimming pool and spa community. • See Pool Safety technical guides here. • The International Swimming Pool and Spa Code (ISPSC), section 305 (or as modified by the jurisdiction) requires barriers to entry on all outdoor residential pools that will effectively prevent small children from gaining unsupervised access to the pool or spa.

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			• Sitting on a broken or uncovered drain may cause evisceration injuries or disembowelment. • As part of regular inspections, ensure that gates are lockable and locked, anti-entrapment covers are in place and GFCI devices are tested monthly.	• The section also contains detailed requirements with regard to barrier heights and clearances, self-closing, self-latching features, openings, lack of climbability, use of a structure as part of a barrier and the role of lockable spa safety covers, powered pool safety covers, alarms, and other supplemental devices. • The GE 60-Amp GFCI Spa Panel is a metal load center, intended for outdoor use with spas, hot tubs, water heaters, and swimming pools. The GFI disconnect provides a convenient low-cost way to satisfy National Electrical Code (NEC) requirements. From $73 at big-box stores. • See Home Depot spa panel installation guide here. • Devices should be inspected and tested regularly.
4.1 Electrical System	• Every unit shall have electric service, outlets and fixtures that are connected to power, and are properly installed, maintained, and grounded. • Every unit shall be supplied with a three-wire, 120/240-volt, single-phase electrical service, not shared with another dwelling unit. • Temporary wiring or extension cords shall not be used as permanent wiring.		• 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.	**For Developers:** • Pay close attention to electrical designs for both new construction and housing rehabilitation. Do not rely on others to provide sufficient receptacle outlets. **For Maintenance and Property Managers:** • Extension cords are a source of trip and fall injuries as well as electrical system overload. • Check for occupant use of extension cords and multi-plug adapters (especially non-grounded) during inspections.
4.1 Electrical System Stretch	• The electrical service shall have a rating of not less than 100 amperes.		• Undersized electrical services often contain too many circuits, straining the capacity of the service.	**For Developers:** • 100 AMPs is the minimum size for single-family dwellings in the IRC and the NEC.
4.2 Outlets	• Every habitable room shall contain at least two separate and remote grounded duplex electric outlets. • Kitchens and bathrooms will contain at least one grounded duplex GFCI protected electric outlet. • Receptacles in garages, crawl spaces, unfinished basements, and outdoors shall be GFCI protected.		• Unlike circuit breakers and fuses, GFCIs are installed to protect the user from electrocution. They constantly monitor electrical currents and quickly shut off the current if an individual becomes part of the circuit. • GFCIs detect amounts of electricity much smaller than those required for a fuse or circuit breaker to activate and shut off the circuit. • AFCIs prevent electrical fires by protecting branch circuits.	**For Developers:** • The requirements mimic the building code. While limited renovation work may not necessitate full compliance with the code, these are reasonable safety requirements. • Best practice is to protect all damp areas, including laundry rooms. **For Maintenance and Property Managers:** • Verify the existence of GFCI protection. Carrying a receptacle/GFCI tester on maintenance calls enables quick and easy testing of standard electrical outlets. Consider including GFCI testing and questions for tenants on electrical issues as standard processes for maintenance calls. Sample tester here. • As part of regular inspections, ensure that GFCI devices are tested monthly. • Check for occupant use of extension cords and multi-plug adapters (especially non-grounded) during inspections. Also in Section 4.1.

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4.2 Outlets Stretch	• In habitable rooms, no location on a wall is more than six feet from an outlet. • Every countertop space 12” or wider shall have a grounded GFCI protected receptacle outlet. No section of counter shall be more than 24 inches 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).		• See above, 4.2 Outlets.	**For Developers:** • The requirements simply mimic the building code. While limited renovation work may not necessitate full compliance with the code, these are reasonable safety requirements. • Consider the Universal Design strategy of locating electrical outlets at a height that is convenient for all. At least 15” above the finish floor for wall-mounted receptacles and no more than 46” above finish floor height for over-counter receptacles.
4.3 Natural Lighting	• Every habitable room shall receive natural light (8% of floor area) from at least one exterior window or skylight. • 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.		• 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.	**For Developers:** • Consider the effects of building orientation and shading on the availability of natural light. • Windows and doors (with glass) can be oriented to provide natural lighting without excessive heat gain and heat loss penalties. Paired with sufficient roof overhangs or awnings they can be shaded in the summer and still provide significant natural light. • Remember balance, as glass areas allow substantially more heat transfer than wall assemblies. • When natural light is insufficient, artificial light must be provided. See Section 4.4.
4.4 Artificial Lighting	• Each bath, non-habitable room and public hall shall contain at least one ceiling or wall-type electric lighting fixture. • Light switches that control fixtures shall be located conveniently for safe use. • 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 ft² of floor area. The distance between light fixtures shall not be greater than 30 feet.		• Adequate lighting is important in allowing people to see unsanitary conditions and to prevent injury. • Adequate switching that is easy to locate in the dark and available at every entrance to a room increases safety. • Burned-out light bulbs render fixtures useless.	**For Developers:** • When natural light is insufficient, artificial light must be provided. • Remember to locate lights where they do the most good: over kitchen sink, in showers, laundry areas, in closets, staircases, and hallways. • Illuminated switches, available in many colors and styles, provide added help in locating switches in the dark. • Make certain that lighting designs include adequate switching of lights so that light fixtures may be controlled from each entrance to a room. • To simplify maintenance, direct your design team to minimize the types of bulb bases used within a project, and for homeownership projects provide spare bulbs to the new owners so that they know what types are used in their home. Consider standardizing on the GU24 bulb base, which is prevalent in Energy Star®-certified light fixtures. • Consider ease of bulb replacement when locating light fixtures. Fixtures over staircases are often located in awkward spots for bulb replacement. Wall fixtures often work well and are easier to access. **For Maintenance:**

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				• Inspect common areas regularly for burned-out bulbs and replace promptly. • Install the longest-lasting bulbs in hard-to-reach areas. • Keep in mind that CFL bulbs are best suited for fixtures that are left on for longer periods of time. Their life is significantly diminished by short lighting cycles. • Maintain an inventory of commonly-used bulbs.
4.4 Artificial Lighting Stretch	• 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 ft² of floor area. • The parking areas and walkways of multifamily housing shall be illuminated by outdoor lighting devices suitable for the premises.		• PCBs have been demonstrated to cause cancer, as well as a variety of other adverse health effects. • Increased interior lighting can help the elderly remain safely in their homes. • Exterior lighting increases resident safety and discourages crime.	**For Developers:** • Consider providing additional lighting in the evening, on timers to save energy. • Design exterior lights to light the ground, shielding the rays from traveling sideways to a neighboring lot. • Investigate light pollution regulations in your jurisdiction related to outdoor lighting. **For Maintenance Staff:** • For basic information on PCBs, look here. • Locate companies that have received EPA approval to handle PCB wastes. Find EPA Chart on disposal of PCB Ballasts is here. • Check the effectiveness of exterior and common-area lighting at night.
5.1 HVAC Systems	All systems will be maintained in good, working condition and if inoperative will be repaired or replaced within 48 hours.		• Institute a system for regular, off-season maintenance of systems. • A good system for logging complaints and issuing work orders is key.	**For Property Managers:** • Institute a system for logging tenant complaints and responding quickly • Schedule regular off-season maintenance of systems. • Keep contracts with service professionals current, and take advantage of off-season pricing for routine service. **For Maintenance Staff:** • Maintain an inventory of commonly-used parts for quick, routine repairs.
5.2 Heating System	• Every dwelling shall have a properly installed heating system in good, safe working condition, capable of adequately heating all habitable rooms and baths. • Heat shall be provided to maintain a minimum temperature of 68° F and maximum 78° F in dwelling unit. • Forced air systems must maintain temperature set point between 55° F and 85° F. Filters (minimum MERV 8) shall be changed at every turnover and at least annually. • Steam and hot water radiators with temperatures above 110° F shall have protective covers.		• The IRC and local habitability codes require that minimum and maximum temperatures be maintained in rental housing. • Exposure to cold temperatures can lead to hypothermia, frostbite, and death. High temperatures can increase dehydration, cardiovascular strain, and trauma, and can cause stroke and mortality. • Poorly maintained HVAC systems may pose safety risks such as fire,	**For Maintenance**: • The IPMC recommends that room temperatures be tested 3' above the floor and 2' from an exterior wall. • Check filters regularly, for fit and cleanliness. Keep replacement filters in stock. **For All:** • When replacing heating plants insist that they be sized to the actual heating and cooling loads. Do not assume that the existing unit was sized properly. See this NREL document and this NREL document as well. • When planning for HVAC equipment replacements as part of your rental portfolio capital replacement strategy, consider improvements to the building envelope and unit envelopes that will reduce air leakage and improve insulation values. The cost of such improvements will in part be offset by lower costs for smaller heating and cooling equipment. See air sealing in 5.4.

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	• Wood stoves shall comply with emission standard 40 C.F.R. § 60 part AAA, and shall have proper clearances (NFPA) to combustible materials.		explosion, and exposure to dangerous byproducts of combustion.	• For *This Old House* article on building radiator covers, click here. • For hot water radiator covers, see this product.
5.2 Heating System Stretch	• 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 through the use of mechanical air conditioning, ventilation systems, or passive design features. • Air filters shall be replaced at least every three months.		• Inspect filters monthly. • Be certain that filters fit snugly and that the filter housing is well sealed. • Consider installing the highest-MERV rated filter allowed by the manufacturer.	**For Developers or Property Managers:** • When specifying new or replacement equipment, consult Energy Star for the latest in efficient heating and cooling equipment. • Be certain that equipment venting is located away from windows and other inlets. **For Maintenance:** • See this video to set a programmable thermostat. • The nest thermostat can program itself, and can be controlled remotely. • FilterLock® by AllergyZone magnetic filter housing cover is an easy way to seal a furnace filter housing with a defective cover.
5.3 Ventilation	• Systems shall deliver fresh air and remove contaminated air. • Every dwelling shall have a ventilation system compliant with ASHRAE Standard 62.1 or 62.2. • Air mechanically exhausted from a bathroom, toilet room, kitchen, clothes dryer, or basement shall be vented directly outside • Ducting for clothes dryers shall be rigid or semi-rigid metal duct. • Pipes, ducts, conductors, fans, and blowers shall discharge gases, steam, vapor, etc. away from adjacent property and other occupants. • Vent pipe openings and any pest-proofing screens that cover them shall be maintained free of debris. • Basement air shall not be used as supply air for an air handling system.		• Proper circulation of fresh air is important to dilute and remove airborne chemical agents, humidity, and mold. • Provide make-up air for combustion appliances • According to the U.S. Fire Administration, "an estimated 2,900 clothes dryer fires in residential buildings are reported to U.S. fire departments each year and cause an estimated 5 deaths, 100 injuries, and $35 million in property loss."	**For Maintenance and Developers:** • Consider the installation of soffits in kitchens (perhaps above wall cabinets) and in baths to run exhaust fan ductwork directly outside. Very simple framing and drywall finishes can suffice. • ASHRAE ventilation standards can be met by a number of systems. For an overview of the options, click here. • ASHRAE 62.2 is for smaller residential structures. Residential Energy Dynamics (RED) has a free calculator for ASHRAE 62.2 compliance; click here for their webpage. RED also has videos on 62.2 available via links on the same page. • For larger structures, ASHRAE 62.1 applies. Engaging an experienced engineer to calculate the required ventilation level and design a system would be prudent. • Make-up air for exhaust fans can come from engineered openings such as air inlets, or from air leaks in the building envelope, or in the worst case scenario, back drafting combustion appliances that admit carbon monoxide into the living space. Random leaks in the building envelope can introduce poor quality air, e.g. from crawl spaces or attics. The risk of back drafting combustion appliances can be practically eliminated by Combustion Zone (CAZ) Testing. CAZ testing is done by BPI Certified Building Analysts. Find one near you here. • UL2158A is a common compliance standard for dryer vents.

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				For Maintenance: • Clothes dryer exhausts are the source of a significant number of household fires annually, and the accumulation of lint in the duct is the main cause. Screens on dryer duct outlets are dangerous, as are any protrusions in the ductwork that can collect lint. Choose dryer outlets and ductwork materials and installation methods carefully. Regularly inspect all vents for blockage and debris.
5.3 Ventilation Stretch	• HVAC equipment shall have the capacity to maintain indoor relative humidity (RH) at or below 60%.		• Studies show the association between dampness and poor health. Damp environments are associated with the presence of dust mites, cockroaches and mold.	**For Maintenance and Developers:** • Keeping humidity levels below 60% would significantly diminish the opportunities for mold growth, and would also adversely affect the preferred environment of some pests, notably dust mites. Ultimately, attaining performance measures that clearly identify a known, beneficial condition is highly desirable. • Practical implementation of this stretch standard would require careful management of moisture sources, and either regular monitoring of indoor humidity levels and interventions when necessary, or a ventilation system controlled by a calibrated humidistat.
5.4 Air Sealing	• Openings into dwellings and dwelling units will be weathertight and sealed to limit air movement and control moisture. • Penetrations between living spaces and either the outside or garages will be sealed. • Weather stripping, thresholds, and door sweeps will be installed and maintained between living spaces and either the outside or garages. • Doorways between habitable rooms and garages shall be equipped with a solid wood, solid or honeycomb steel door (1-3/8" thick) or 20-minute fire-rated door, equipped with an automatic closing mechanism. • There shall be no supply or return vent openings in a garage that connect to air handlers serving habitable spaces. • 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.		• Controlling air leakage saves energy and prevents health issues associated with mold and moisture. • Air sealing can prevent migration of smoke, cooking odors, noise, radon, pests, drafts, and fire. • Air sealing also prevents the infiltration of CO and any stored chemicals from the garage to the living space. • Air sealing has a good cost/benefit ratio.	**For Developers:** • Blower door testing is an excellent way to quantify air leakage in new projects and in substantial rehabilitation. Blower door tests are required in the 2012 and 2015 IECC. **For Maintenance:** • Check door sweeps often and replace when necessary. Apartment entrance doors on hallways in apartment buildings are a significant source of make-up air for units with exhaust ventilation systems. • Caulk and seal regularly, with high-quality products appropriate for the environment. • Consider adhesion, paintability, cleanability, temperature, and location. • For a training on caulks and sealants from the North American Retail Hardware Association, click here. • See Section 3.2 for information on door closers. • For sealing larger holes in a manner that prohibits pest entry, consider a copper mesh backing. Click here for product information.

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5.4 Air Sealing Stretch	• Air handling equipment and associated ductwork shall be located (or relocated) within the conditioned space.		• Locating air handling equipment in conditioned space saves energy and increases the efficiency of HVAC performance.	**For All:** Although challenging in some structures, ductwork can, in some instances, be run effectively in hallway ceilings.
6.1 Moisture	• Building components must be watertight, weathertight, free of persistent dampness or moisture, and in good repair. • Storm water drainage systems must move water away from the building. • Exterior wood shall be protected by paint or another protective treatment. • No signs of mold or moisture. Any sources of excessive dampness or moisture shall be located and corrected. • Cold water pipes and ductwork susceptible to condensation shall be insulated. • Crawl spaces shall be sealed and insulated from the outdoors, free of moisture problems or be sealed from the living space.		• Damp indoor environments can increase mold, dust mites, and bacteria and attract pests. • Dampness can damage building materials and deteriorate finishes.	**For Maintenance and Developers:** • Poor storm water management and water leaks in the building envelope are the main causes of moisture problems. Make certain grading away from the building is adequate, and that any gutters and downspouts are working properly. Inspect regularly for leaks in roofing and in the building envelope, especially around wall penetrations such as windows, doors and those for mechanical systems. • A moisture meter can be used to track down the source of leaks. • Crawl spaces and basements are often sources of high moisture levels. Carefully sealing crawlspaces can cure many moisture problems. See this site by Advanced Energy on crawl spaces. • Foam pipe wrap that is carefully installed and well-sealed on both hot and cold water pipes is inexpensive and effective at both lowering water heating costs and preventing condensation. • Well-sealed and insulated ductwork is equally affordable and effective. • Some states and local jurisdictions require licensing for mold professionals. If your jurisdiction requires, follow local guidelines. • Otherwise, fix the moisture problem and clean up the mold. For EPA mold course and guidelines on mold removal, look here.
6.1 Moisture Stretch	• Use exterior weather-resistant barrier systems to reduce 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: o 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		See Moisture above.	**For Developers:** • For information on vapor barriers and their role in building assemblies, see this article by Building Science Corporation. **For Developers and Maintenance:** • Wall and ceiling surfaces adjacent to tub/shower fixtures are very susceptible to moisture damage and are often maintenance problems. Consider paperless drywall as a finish in these areas, and also consider using water impervious finishes several inches past the outside of the tub/shower enclosure. Also, see this guide on the topic from NREL. **For Property Managers and Maintenance:** • See that condensate drains remain connected and flowing.

	rigid), kraft-faced insulation, and seasonally adjusting membranes. o No vinyl wallpaper or other impermeable interior finish on the interior surface of exterior walls within an air-conditioned dwelling. o Use exterior drainable rigid insulation systems to reduce wall assembly condensation risk. • The building and its systems shall meet the following moisture management criteria: o When the building is being mechanically cooled, ventilation air shall be dried to a dew point value below the building's dew point. o Condensation inside HVAC components and air distribution ductwork shall be drained to an appropriate sanitary drain or condensate collection system. o Indoor surfaces of both occupied and unoccupied spaces shall not be overcooled. Maintain average surface relative humidity (RH) under 80%. o Keep indoor dew point low enough to ensure no condensation occurs on the exposed surfaces of cool HVAC components or on building materials or furnishings. o Humidifiers shall be sized, installed, and controlled so they do not overload the air with humidity.			• Consider treatment of condensate drain water with a condensate neutralizer to address the caustic nature of condensate and its effect on drain systems. • Are there unnecessary humidifiers installed and adding extra moisture?
6.2 Solid Waste	Containers of sufficient capacity for the occupancy, outside dwelling for trash, and recycling storage.		• Containers of sufficient size will increase sanitation, minimize odors and pests, and improve the appearance of the property. • Properly labeled recycling containers can increase resident participation in recycling programs.	**For Property Managers:** • Inspect exterior trash and recycling containers regularly for covers, holes, rust, and presence of pests. • Put screening over drainage holes to keep out pests. • Be certain containers are emptied regularly.

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6.2 Solid Waste Stretch	Exterior trash and recycling containers shall be placed at least 30 feet (9 meters) from the building, unless such space is not available.		• Keeping containers away from the building helps minimize pest intrusion in the units.	**For Developers:** • Plan convenient locations for trash and recycling containers that maximize resident participation and allow for easy trash and recycling pick-up. **For Property Managers:** • Provide each unit with trash containers with tight-fitting lids, and instruct residents to empty trash daily.
6.3 Pest Manage-ment	• Integrated pest management (IPM) methods shall be used to maintain every dwelling free of infestation. • No visible openings to equal or exceed 1/8 of an inch without screen or covering. • Trash, paper, boxes, lumber, food, etc., will be stored in a manner that does not harbor pests. • Vegetation shall be maintained with a minimum 6” clearance from building components. • Operable windows shall have screens. • Foggers and organic phosphates will not be used for infestation.		• Rodents cause infectious disease and destroy property. • Cockroaches and mice are linked to asthma and respiratory disease. • Pest residues that remain post-infestation elimination continue to pose a health threat. • Misuse and overuse of pesticides is common and can harm human health. • Preventing pest infestation through IPM improves resident health and quality of life, and saves money in the long term. • IPM methods such as sealing entry points also reduce dampness and drafts, save energy, and limit the spread of fire and odors.	**For All:** • Stop Pests in Housing is operated by the Northeastern IPM Center at Cornell University. It is the best resource for the latest in residential pest management. For links to their videos and other useful websites, click here. • Seal points of entry. • Keep plant materials away from the structure (harborage). • Screens for operable windows. **For Developers:** • Provide secure locations for trash, separated from the buildings. • For a document, “Pest Prevention by Design,” click here. • Guidebook for Structural Approaches to Integrated Pest Management: click here. **For Property Managers and Maintenance:** • Implement ongoing program of property-wide monitoring and inspection to detect early-stage infestations while they are easier to stop. • IPM principles can be implemented as a part of regular maintenance and especially at unit turn over. • Tenant education is a powerful tool. • Hiring pest control operators (also referred to as pest management professionals) trained and conscientious in the implementation of IPM principles is crucial. • Understanding IPM for procurement staff: click here. • How to hire a pest management firm knowledgeable in IPM: click here. • Training on IPM, with content for staff, contractors, and tenants: click here.

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7.1 General Require-ments	All chemical and radiological agents including deteriorated lead-based paint, friable asbestos-containing material, formaldehyde, volatile organic compounds, radon, pesticides, and methamphetamine, will be contained, stored, removed, or mitigated.			**For Developers:** • Plan for safe replacement and disposal of existing building components. • Build in safe storage areas for on-site chemicals.
7.2 Lead-Based Paint	• Lead dust levels at or above federal regulatory limits pursuant to 40 C.F.R. § 745.65 are deemed hazardous in or near dwelling. • Painted surfaces must be maintained intact, and causes of deterioration corrected. • Renovations must be in accordance with 40 C.F.R. § 745, Subpart E. • Unless paint 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 create lead dust (see details in standard).		• The use of lead-based paint (LBP) was legal in residential housing until 1978. • Common renovation, repair, and painting activities that disturb lead-based paint (like sanding, cutting, replacing windows, and more) can create hazardous lead dust and chips which can be harmful to adults and children. • Poor maintenance of LBP can create hazards. • Exposure to lead hazards can result in permanent and irreversible damage. • Children under the age of 6 and pregnant women are most vulnerable to the effects.	**For Property Managers and Maintenance:** • Have properties inspected, and know where LBP is located on your properties. • On LBP, use only contractors and firms who are RRP certified and follow lead-safe work practices. To find a certified renovation firm, see the EPA site here. • To find certified testing, risk assessment and abatement firms, look here. **For Maintenance:** • Become certified in RRP. To find a class near you, see the EPA site here.
7.2 LBP Stretch	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% by weight; (2) dust on floors—10 micrograms of lead per square foot of settled dust (µg/ft²); (3) dust on interior window sills—100 µg/ft²; and (4) 40 µg/ft² on porches.		• There is no safe limit of lead exposure.	**For All:** • Use lead-safe work practices and require clearance testing after all renovation activities that disturb LBP in pre-1978 housing. • Require clearance to these higher levels.
7.3 Asbestos	• All owners must ensure that asbestos-containing material be maintained non-friable and free from any defects such as holes, cracks, tears, and/or		• Exposure to asbestos increases the risk of developing lung disease.	**For Maintenance:** • Learn to recognize suspected asbestos, and have suspect materials tested before you disturb them.

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	looseness that may allow the release of fibers into the environment. • Friable asbestos must be abated. • Any activity that will disturb asbestos must be performed by a certified asbestos professional per state and local requirements.		• Asbestos is found in many building materials, including siding, flooring, and 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.	• Vermiculite insulation should be assumed to be contaminated with asbestos and should not be disturbed. Trained professionals must be hired to remove it. • Inspect any asbestos containing materials regularly for damage. • Damaged or deteriorated asbestos can be repaired (sealed or covered) or removed. **For All:** • The EPA and most states certify or license asbestos inspectors. To find a licensed abatement professional in your area, contact your state agency here. • For tips on hiring an asbestos professional, see EPA here. • To find labs for testing asbestos, click here. • Be certain to obtain a disposal manifest for any asbestos removed from your projects. This provides documentation that the asbestos was handled and disposed of properly.
7.4 Toxic Substances in Manufactured Building Materials	• Building materials consisting of hardwood plywood, medium-density fiberboard, and particleboard must meet the formaldehyde emission standards of 15 U.S.C. 2697(b)(2). • Building materials used for maintenance and renovations must be certified to meet the formaldehyde emission standards of 15 U.S.C. 2697(b)(2) and cannot contain volatile organic chemicals (VOCs) or low VOC emissions.		• Formaldehyde is a prominent VOC found in household and construction products, and is classified 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. • Exposure to VOCs can cause or aggravate health conditions, including allergies, asthma, and irritation of the eyes, nose, and airways. • Interior paints and primers, glues, and adhesives may release VOCs, particularly when drying.	**For Developers and Maintenance:** • These products include particleboard (subflooring, shelving and in cabinetry and furniture), hardwood plywood paneling (decorative wall covering, in cabinets and furniture), and medium-density fiberboard (drawer fronts, cabinets, and furniture tops). • Specify use of low- or no-VOC products. Use the following standards: o Coatings - Green Seal GS-11, with Colorant Added at the Point-of-Sale VOC Content Limit. o Adhesives, Caulks and Sealants - SCAQMD, 1168 VOC limits. o Carpet and padding - Carpet and Rug Institute's Green Label certification. • Low- and no-VOC paints are available from most manufacturers; even big-box store lines. • Ask for the safety data sheet (formerly MSDS) for products and chemicals you use/install. It lists the properties of each chemical, physical, health, and environmental hazards, and safety precautions for handling, storing, and transporting the chemical. • See Section 2.4 Kitchen stretch for info on NAUF (no added urea formaldehyde) kitchen cabinets.

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7.5 Radon	Radon 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 is an odorless, tasteless, and invisible gas produced by the decay of naturally occurring uranium in soil and water. • Exposure to radon is the second-leading cause of lung cancer after smoking. • Sealing cracks and crevices against radon also reduces dampness and drafts, saves energy, keeps pests out and limits the spread of fire and odors.	**For Developers:** • For new construction, design with radon-resistant construction techniques. See EPA guidance and Appendix F of the IRC. All of the techniques and materials are commonly used in home construction. No special skills or materials are required when adding radon-resistant features as a new home is being built. • Radon zone maps can help you predict high radon readings in your area, but they are no guarantee. To see EPA radon zone maps, click here. **For All:** • Have all existing homes tested, regardless of zone. Testing is the only way to determine if high levels of radon are present. • Mitigate if necessary. • Where to get radon testing kits? Discount kits may be available through EPA website here. Kits are sold at some home improvement centers. • If you are interested in finding a qualified radon service professional, find your state radon contact here or the National Radon Proficiency Program here or National Radon Safety Board here. • For information on state and local radon programs and resources, look here.
7.5 Radon Stretch	Radon present at levels at or above two pCi/L in the lowest habitable level of the dwelling shall be deemed hazardous.		• See above.	• Test and mitigate (as above) to these stricter standards.
7.6 Pesticides	Pesticides shall only be used in accordance with IPM methods.		• Misapplication of pesticides can harm occupants and render IPM methods ineffective.	**For All:** • Pesticides should be used only by licensed pest management professionals. • Pesticides should not be applied by residents. • Hold a pesticide collection day, and institute a "buy-back" program or other "reward" for pesticides turned in by residents.
7.7 Methamph-etamine	A dwelling that has been used for methamphetamine manufacture shall be vacated until safety is approved by certified testing.		• When a meth lab is shut down, equipment and chemicals are removed by law enforcement, but the property may remain contaminated with hazardous chemical residues. • Methamphetamine exposure causes sever health effects, including breathing problems or respiratory irritation, skin and eye irritation, headaches, nausea, and dizziness.	**For All:** • Call your local board of health if methamphetamine production activity is suspected. • An industrial hygienist may test for contaminants. • Environmental contractors with appropriate safety equipment can clear the area. • Treat the area as a hazardous waste site until it has been cleared. • The Drug Enforcement Administration (DEA) keeps a national registry that logs the locations of known contaminated homes as reported by law enforcement. • See the Illinois Department of Public Health Fact Sheet, "Guidelines for Cleaning up Former Methamphetamine Laboratories," and the U.S. Environmental

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			High exposures even for a short time can cause death or severe lung damage and skin or throat burns.	Protection Agency document, "Voluntary Guidelines for Methamphetamine Laboratory Cleanup."
7.8 Smoke in Multifamily Housing	• Smoking shall be prohibited in all indoor common areas of multifamily buildings. • Smoking shall be prohibited in exterior areas less than 25 feet (762 cm) from building. • Tenants shall be informed of smoking policies in writing.		• Cigarette smoking kills 480,000 Americans each year, making it the leading preventable cause of death in the United States. • Secondhand smoke exposure causes disease and premature death in children and adults who do not smoke. • There is no safe level of secondhand smoke. • A smoke-free rule will reduce damage and maintenance costs associated with smoking. • Costs to turnover a smoking unit can be 5-7 times those of a non-smoking unit. • It is estimated that smoking causes over 100,000 fires each year, resulting in more than 500 death and close to half a billion dollars in direct property damage; additionally, smoking is the lead cause of fire related deaths in multifamily buildings.	**For Property Managers:** • Include non-smoking policies in lease provisions. For sample lease language, look here. • For HUD "how-to" and resource brochures, pamphlets and other information designed to assist owners/management agents and residents of multifamily housing, click here.
7.8 Smoke Stretch	• 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.		See above.	See above. • Include non-smoking policies in lease provisions. For sample lease language, look here.