

**402.5.2 Lavatory Faucets in Other Than Residences, Apartments, and Private Bathrooms in Lodging Facilities.** Lavatory faucets installed in bathrooms of buildings or occupancies other than those specified in Section 402.5.1 shall be in accordance with Section 402.5.2.1 or Section 402.5.2.2.

**402.5.2.1 Maximum Flow Rate.** The flow rate shall not exceed 0.5 gpm (1.9 L/m) at 60 psi (414 kPa) in accordance with ASME A112.18.1/CSA B125.1.

**402.5.2.2 Metering Faucets.** Metering faucets shall deliver not more than 0.25 gallons (1.0 L) of water per cycle.

**402.6 Showerheads.** Showerheads shall not exceed a flow rate of 2.0 gpm (7.6 L/m) at 80 psi (552 kPa) and shall be listed to ASME A112.18.1/CSA B125.1 and the EPA WaterSense Specification for Showerheads.

**402.6.1 Multiple Showerheads Serving One Shower Compartment.** The total allowable flow rate of water from multiple showerheads flowing at any given time, with or without a diverter, including rain systems, waterfalls, bodysprays, and jets, shall not exceed 2.0 gpm (7.6 L/m) per shower compartment, where the floor area of the shower compartment is less than 1800 square inches (1.161 m<sup>2</sup>). For each increment of 1800 square inches (1.161 m<sup>2</sup>) of floor area thereafter or part thereof, additional showerheads are allowed, provided the total flow rate of water from all flowing devices shall not exceed 2.0 gpm (7.6 L/m) for each such increment.

**Exceptions:**

- (1) Gang showers in non-residential occupancies. Singular showerheads or multiple shower outlets serving one showering position in gang showers shall not have more than 2.0 gpm (7.6 L/m) total flow.
- (2) Where provided, shower compartments required for persons with disabilities in accordance with Table 901.1 shall not have more than 4.0 gpm (15.0 L/m) total flow, where one outlet is the hand shower.

**402.7 Bath and Shower Diverters.** Tub spout bath and shower diverters, while operating in the shower mode, shall perform with zero leakage.

**402.8 Shower Valves.** Shower valves shall meet the temperature control performance requirements of ASSE 1016/ASME A112.1016/CSA B125.16 when tested for the rated flow rate of the installed showerhead.

**402.8.1 Marking.** Control valves for showers and tub-shower combinations shall be tagged, labeled, or marked with the manufacturer's minimum rated flow and such marking shall be visible after installation.

**402.9 Commercial Pre-Rinse Spray Valves.** The flow rate for a pre-rinse spray valve installed in a commercial kitchen to remove food waste from cookware and dishes prior to cleaning shall not be more than 1.28 gpm (4.8 L/m) at 60 psi (414 kPa). Where pre-rinse spray valves with maximum flow rates of 1.0 gpm (3.8 L/m) or less are installed, the static pressure shall be not less than 30 psi (207 kPa). Commercial

kitchen pre-rinse spray valves shall be equipped with an integral automatic shutoff. Pre-rinse spray valves shall be listed to the EPA WaterSense Commercial Pre-rinse Spray Valve Specification.

**402.10 Emergency Safety Showers and Eye Wash Stations.** Emergency safety showers and emergency eye wash stations shall not be limited in their water supply flow rates.

**402.11 Drinking Fountains and Bottle Filling Stations.** Bottle filling stations shall be included on or used as a substitute to meet the requirements of drinking fountains in at least 50 percent of the requirements for drinking fountains. Bottle filling stations and drinking fountains shall be self closing.

**402.12 Installation.** Water-conserving fixtures and fixture fittings shall be installed in accordance with the manufacturers' instructions to maintain their rated performance.

**403.0 Composting Toilet and Urine Diversion Systems.**

**403.1 General.** The provisions of this section shall apply to the design, construction, performance, alteration, and repair of composting toilet and urine diversion systems.

**403.2 Design and Construction Requirements.** Composting toilets, composting toilet systems, and urine diversion systems shall meet the design, construction, and performance requirements of Section 403.2.1 or Section 403.2.2.

**403.2.1 Listed Composting Toilets and Composting Toilet Systems.** Composting toilets and composting toilet systems shall be listed to NSF 41.

**403.2.2 Alternative Design Systems.** Where approved by the Authority Having Jurisdiction, composting toilet and urine diversion systems for residential and commercial applications shall comply with the provisions of Section 403.3 through Section 403.9.

**403.3 System Materials and Components.** Pipe, pipe fittings, traps, fixtures, material, and devices used in composting toilet and urine diversion systems that are expected to contact leachate or diverted urine shall be listed or labeled (third-party certified) by a listing agency (accredited conformity assessment body), unless otherwise approved by the Authority Having Jurisdiction. Materials and components shall comply to approved applicable recognized standards referenced in this standard and the plumbing code, and shall be free from defects. Unless otherwise provided for in this standard, materials, fixtures, or devices used or entering into the construction of plumbing systems, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval.

**403.4 System Design.** Composting toilet and urine diversion systems complying with Section 403.0 shall be designed by a person registered or licensed to perform plumbing design work or who demonstrates competency to design composting toilet and urine diversion systems.

**403.5 Permit.** It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any composting toilet and urine diversion system in

a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.

**403.6 Maintenance and Inspection.** Composting toilet and urine diversion systems and components shall be maintained and inspected in accordance with Section 403.6.1 through Section 403.6.3.

**403.6.1 Maintenance Responsibility.** The required maintenance and inspection of composting toilet and urine diversion systems shall be the responsibility of the property owner, unless otherwise required by the Authority Having Jurisdiction. The property owner is responsible for retaining test result records in accordance with Section 403.8.5.2 and making them available to the Authority Having Jurisdiction upon request. Upon transfer of property or tenancy, all test records shall be transferred and humus shall be re-tested after its first treatment period and a record retained.

**403.6.2 Operation.** Composting toilet and urine diversion systems shall be operated in a safe and sanitary condition in accordance with the owner's manual in accordance with Section 403.7.

**403.6.3 Inspection.** In the event of a nuisance complaint or documented system failure, the composting toilet and urine diversion system shall be made available for inspection and the owner or owner's agent shall conduct sufficient repairs or alterations to the composting toilet system. At the request of the Authority Having Jurisdiction, results of all laboratory testing and new tests in accordance with Section 403.8.5 following repairs to alleviate dangerous or unsanitary conditions shall be provided at the owner's expense.

**403.7 Operation and Maintenance Manual.** An owner's manual shall present clear instructions for maintenance and be transferred to the new owner upon transfer of property or tenancy. The owner's manual shall include:

- (1) Schedule for addition of necessary compost additives.
- (2) Source or provider of necessary compost additives. Source may be on-site.
- (3) Schedule and instructions for all regular maintenance tasks.
- (4) Expected input of and capacity for excreta and compost additives to compost toilet system specifying loading of commode(s) and compost processor(s).
- (5) Plan for container transfer and cleaning where transfer is used.
- (6) Expected schedule for removing humus from composting processors and where used secondary composting bins.
- (7) Plan for on-site disposal of humus or professional removal.
- (8) Plan for managing leachate.
- (9) Plan for microbial testing in accordance with Section 403.8.5.2.

**403.8 Composting Toilet System Design Requirements.** The design and installation of composting toilet systems shall be in accordance with Section 403.8.1 through Section 403.8.6.

**403.8.1 Corrosion Resistance.** All components expected to contact excreta or leachate shall be constructed of corrosion-resistant material such as stainless steel or

durable polymers. Concrete in contact with excreta or leachate shall meet requirements of Section 403.8.2.

**403.8.2 Concrete Construction.** Concrete construction shall be reinforced, watertight and able to withstand loading weight. Where drainage is required, the processor floor shall be sloped not less than 1/4-inch per foot. The flange of each sub-drain shall be set level.

**403.8.3 Commodes.**

**403.8.3.1 Structure.** Commodes shall be designed to support users.

**403.8.3.2 Odor.** Commode design or use shall mitigate the infiltration of odors into the building during normal operation and in the event of temporary power failure.

**403.8.3.3 Contact.** Commodes shall transport excreta into the compost processor or contain excreta for transfer as designed according to the owner's manual.

**403.8.3.4 Vectors.** Commodes shall limit vectors and prevent human contact except for regular maintenance as designed according to the owner's manual.

**403.8.4 Compost Processors.** Compost processors shall be designed in accordance with Sections 403.8.4.1 through 403.8.4.9 and shall maintain unsaturated aerobic composting conditions within the compost mass, through the drainage, absorption, or desiccation of leachate, and aeration of the processor.

**403.8.4.1 Leachate.** Leachate shall be collected for removal or recirculation within the processor, evaporated, or drained to an approved plumbing drainage system or other location approved by the Authority Having Jurisdiction. Leachate storage tanks shall be constructed and installed in accordance with the following:

**403.8.4.1.1 Venting.** Leachate storage tanks shall be vented as required for pressure equalization. When required, vents shall be installed on leachate storage tanks and shall extend from the top of the tank. The connection of storage tank vents to the plumbing venting system shall be six inches above the flood level rim of the highest fixture. Vents extending to the outdoor shall terminate no less than 12-inches above grade. The vent terminal shall be directed downward and covered with a 3/32 inch mesh screen to prevent the entry of vermin and insects.

**403.8.4.1.1.1 Vent Size.** Pressure equalization vents that prevent nitrogen loss by the use of restrictions, or of piping or tubing that is less than the minimum pipe diameter required in the plumbing code shall be approved by the Authority Having Jurisdiction.

**403.8.4.1.2 Overflow.** Where storage tank overflows are installed they shall be connected to the plumbing drainage system.

**403.8.4.1.2.1 Backwater Valve.** Storage tank overflows, when subject to backflow, shall be provided with a backwater valve

at the point of connection to the plumbing drainage system. The backwater valve shall be accessible for inspections and maintenance.

**403.8.4.1.3 Construction.** Leachate storage tanks shall be constructed of polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polyamide (Nylon) or a blend of PET, PEN, ethyl vinyl alcohol (EVOH), Nylon, HDPE, or other tanks listed or certified to US 49 CFR Section 178.274 Specifications for UN Portable Tanks.

**403.8.4.1.4 Above Grade.** Above grade storage tanks are prohibited where subject to freezing conditions, or shall be provided with an adequate means of freeze protection. The above grade leachate storage tank shall be provided with a high-water alarm. The alarm shall report when 80 percent volume is reached.

**403.8.4.1.5 Below Grade.** Leachate storage tanks installed below grade shall be structurally designed to withstand all anticipated earth or other loads. Tank covers shall be capable of supporting an earth load of not less than 300 pounds per square foot (lb/ft<sup>2</sup>) (1465 kg/m<sup>2</sup>) when the tank is designed for underground installation. Below grade leachate tanks installed underground shall be provided with manholes. The manhole opening shall be a minimum diameter of 20 inches (508 mm) and located a minimum of 4 inches (102 mm) above the surrounding grade. The surrounding grade shall be sloped away from the manhole. Underground tanks shall be ballasted, anchored, or otherwise secured, to prevent the tank from floating out of the ground when empty. The combined weight of the tank and hold down system should meet or exceed the buoyancy force of the tank. The below grade leachate storage tank level shall be provided with a high-water alarm.

**403.8.4.1.6 Marking.** Where openings are provided to allow a person to enter the tank, the opening shall be marked with the following words: "DANGER-CONFINED SPACE."

**403.8.4.1.7 Openings.** All openings shall be covered and secured to prevent tampering. Openings shall be screened or covered to prevent rodent infiltration and be protected against unauthorized human entry.

**403.8.4.2 Vectors.** The compost processor shall be designed and installed to limit vector access through management as required in the owner's manual.

**403.8.4.3 Transfer.** Where unfinished excreta or diverted urine is transferred between processors or from commode to processor, transfer and cleaning of containers and provisions for limiting user exposure shall be according to the owner's manual.

**403.8.4.4 Watertightness.** Processors shall be

constructed of watertight material in accordance with Section 403.8.1.

**403.8.4.5 Rodentproofing.** The compost processor shall be protected to prevent the entrance of insects, birds, or rodents. No unsecured opening other than vents, drainage, or commode may exceed ½-inch in the least dimension.

**403.8.4.6 Active Conditions.** The compost processor or processors shall be sized to compost excreta for a minimum of one year of biologically active conditions. Biologically active conditions are at or above a daily average of 42°F (6°C).

**Exception:** Systems with shorter retention shall be permitted where either,

- (a) humus from the compost processor has been tested according to Section 403.8.5.2 and there is either a secondary composting stage where humus is retained in a well maintained compost bin or other facility designated for the exclusive purpose of containing humus removed from the compost processor, or
- (b) humus is removed off site for processing or disposal at an approved facility.

**403.8.4.7 Secondary Composting.** Humus to be transferred to secondary composting shall first be tested according to Section 403.8.5.2. Secondary composting shall be labeled and protected from human contact. Contact with precipitation and surface waters is prohibited.

**403.8.4.8 Ventilation.** Negative ventilation between the commode and compost processor shall be provided when the compost processor is connected directly to the commode without a trap. Commodes that are not connected to the compost processor do not require a vent.

**403.8.4.8.1 Vent Terminals.** Vent stacks shall terminate exterior the building as required by the plumbing or mechanical code.

**403.8.4.9 Sizing.** The compost processor shall be sized to accommodate the maximum daily adult usage as specified by the manufactures published ratings. Site built compost processors shall be sized to hold a minimum of 10 gallons of material per person per year while allowing for the removal of the humus, or as specified by the system designer.

**403.8.5 Testing.** Composting toilet systems shall be tested in accordance with Section 403.8.5.1 and Section 403.8.5.2.

**403.8.5.1 Compost Processors.** Compost processors shall be tested for water tightness by filling the system to the maximum designed liquid storage capacity of the unit for a duration of 24 hours.

**403.8.5.2 Humus.** The owner or owner's agent of the composting toilet system shall verify user's compliance with the manufacturer's maintenance and operation manual in accordance with Section 403.7 by submitting a sample of the humus from the first treatment period after a minimum of one



year of biologically active conditions to a certified laboratory before removal of humus from the composting processor. Where multiple compost processors are used, the humus sample shall be removed from the last compost processor. The sample collection shall be tested in accordance with EPA/625/R-92/013, Appendix F, Section 1.2. Humus shall not have a moisture content exceeding 75 percent by weight, and shall not exceed 200 fecal coliforms/gram.

**403.8.6 Humus Removal.** Humus shall be removed according to the owner's manual. Humus from the compost processor used around ornamental shrubs, flowers, trees, or fruit trees shall be mixed with soil or mulch and covered with no less than 3 inches of cover material. Depositing humus from any composting toilet system around any edible vegetable or vegetation shall be prohibited.

#### **403.9 Urine Diversion System Design Requirements.**

The design and installation of urine diversion systems shall be in accordance with Section 403.9.1 through Section 403.9.13.

**403.9.1 Purpose.** The purpose of this section is to enable the installation of urine diversion and collection systems to improve the function of composting toilet systems and prevent nutrient pollution of ground and surface waters.

**403.9.2 Material Requirements.** Material used for urine diversion shall be stainless steel or non-metallic pipe. Concrete piping is prohibited.

**403.9.3 Identification.** All urine diversion piping shall be identified.

**403.9.4 Change of Direction.** Changes in direction of urine diversion piping shall be made by a long-sweep 90 degree fitting or other approved fittings of equivalent sweep.

**403.9.5 Sizing.** Pipe sizes shall be in accordance with the plumbing code. Each urine diversion fixture shall be rated as one drainage fixture unit. Piping or tubing for urine diversion that is less than the minimum pipe diameter required in the plumbing code shall be approved by the Authority Having Jurisdiction.

**403.9.6 Traps.** Fixtures discharging into urine diversion piping connected to the plumbing drainage system shall be trapped and vented according to the plumbing code.

**403.9.7 Grade of Horizontal Piping.** Urine diversion piping shall be installed at a minimum grade of 1/2-inch per foot, or 4 percent toward the point of disposal.

**403.9.8 Cleanouts.** A cleanout shall be provided at the upper terminal of each drain line, every 50 feet and at an aggregate horizontal change of direction exceeding 135 degrees.

**403.9.9 Venting.** Commode fixtures without traps that require ventilation shall be connected to either a dry toilet ventilation stack or a urine diversion ventilation stack. Nonwater urinals used as urine diversion systems shall be connected to a dry toilet ventilation stack or a urine diversion ventilation stack.

**403.9.10 Discharge.** A urine-diversion system shall

be diverted to a storage tank or discharge to an approved plumbing drainage system.

**403.9.11 Urine Storage Tanks.** Urine storage tanks shall be constructed and installed in accordance with Section 403.9.11.1 through Section 403.9.11.8.

**403.9.11.1 Venting.** Urine storage tanks shall be vented as required for pressure equalization. When required, vents shall be installed on urine storage tanks and shall extend from the top of the tank. The connection of storage tank vents to the plumbing venting system shall be six inches above the flood level rim of the highest fixture. Vents extending to the outdoor shall terminate no less than 12-inches above grade. The vent terminal shall be directed downward and covered with a 3/32 inch mesh screen to prevent the entry of vermin and insects.

**403.9.11.1.1 Vent Size.** Pressure equalization vents that prevent nitrogen loss by the use of restrictions, or of piping or tubing that is less than the minimum pipe diameter required in the plumbing code shall be approved by the Authority Having Jurisdiction.

**403.9.11.2 Traps.** Urine storage tanks shall prevent odors and nitrogen loss from the tank inlet by means of a P-trap, mechanical trap, submerged inlet piping, or other means approved by the Authority Having Jurisdiction. Submerged inlet piping shall remain submerged during use and after pumpout.

**Exception:** Tanks of five gallons or less connected to fixtures with active ventilation or having an integrated seal.

**403.9.11.3 Overflow.** Where storage tank overflows are installed they shall be connected to a plumbing drainage system.

**403.9.11.3.1 Backwater Valve.** Storage tank overflows subject to backflow shall be provided with a backwater valve at the point of connection to the plumbing drainage system when connected to a public sewer system or on-site wastewater system. The backwater valve shall be accessible for inspections and maintenance.

**403.9.11.4 Construction.** Urine storage tanks shall be constructed of polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polyamide (Nylon) or a blend of PET, PEN, ethyl vinyl alcohol (EVOH), Nylon, HDPE, or other tanks listed or certified to US 49 CFR Section 178.274 Specifications for UN Portable Tanks.

**403.9.11.5 Above Grade.** Above grade storage tanks shall be prohibited where subject to freezing conditions, or shall be provided with an adequate means of freeze protection. The above grade urine storage tank shall be provided with a high-water alarm. The alarm shall report when 80 percent volume is reached.

**403.9.11.6 Below Grade.** Urine storage tanks installed below grade shall be structurally designed to withstand all anticipated earth or other loads.

Tank covers shall be capable of supporting an earth load of not less than 300 pounds per square foot (lb/ft<sup>2</sup>) (1465 kg/m<sup>2</sup>) when the tank is designed for underground installation. Below grade urine tanks installed underground shall be provided with manholes. The manhole opening shall be a minimum diameter of 20 inches (508 mm) and located a minimum of 4 inches (102 mm) above the surrounding grade. The surrounding grade shall be sloped away from the manhole. Underground tanks shall be ballasted, anchored, or otherwise secured, to prevent the tank from floating out of the ground when empty. The combined weight of the tank and hold down system should meet or exceed the buoyancy force of the tank. The below grade urine storage tank level shall be provided with a high-water alarm. The alarm shall report when 80 percent volume is reached.

**403.9.11.7 Marking.** Where openings are provided to allow a person to enter the tank, the opening shall be marked with the following words: "DANGER-CONFINED SPACE."

**403.9.11.8 Openings.** All openings shall be covered and secured to prevent tampering. Openings shall be screened or covered to prevent rodent infiltration and be protected against unauthorized human entry.

**403.9.12 Maintenance Plan.** Every urine diversion system shall have a maintenance plan that includes both a pumpout schedule and contract, or an onsite discharge plan. The maintenance plan shall also include a pipe cleaning schedule.

**403.9.13 Treatment, Reuse, and Disposal.** Where urine is to be reused onsite, a treatment method for sanitization shall be included in the owner's manual. Approved methods of treatment shall include:

- (1) Retention without addition for six months before usage. Two or more holding tanks shall be required for retention,
- (2) Application to the compost processor,
- (3) Pasteurization to 158° F. (70°C) for thirty minutes, or
- (4) Other method approved by the Authority Having Jurisdiction.

#### **404.0 Appliances.**

**404.1 Dishwashers.** Residential and commercial dishwashers shall be in accordance with the Energy Star program requirements.

**404.2 Clothes Washers.** Residential clothes washers shall be in accordance with the Energy Star program requirements. Commercial clothes washers shall be in accordance with Energy Star program requirements, where such requirements exist.

#### **405.0 Pressure Regulator.**

**405.1 Installation.** Pressure regulators shall be installed in accordance with the plumbing code.

#### **406.0 Water Softeners and Treatment Devices.**

**406.1 Water Softeners.** Water softeners shall be listed to NSF 44. Water softeners shall have a rated salt efficiency exceeding 3400 grains (gr) (0.2200 kg) of total hardness exchange per pound (lb) (0.5 kg) of salt, based on sodium chloride (NaCl) equivalency, and shall not generate more than 4 gallons (15.1 L) of water per 1000 grains (0.0647 kg) of hardness removed during the service cycle.

**406.2 Water Softener Limitations.** In residential buildings, where the supplied potable water hardness is equal to or less than 8 grains per gallon (gr/gal) (137 mg/L) measured as total calcium carbonate equivalents, water softening equipment that discharges water into the wastewater system during the service cycle shall not be allowed, except as required for medical purposes.

**406.3 Point-of-Use Reverse Osmosis Water Treatment Systems.** Reverse osmosis water treatment systems installed in residential occupancies shall be equipped with automatic shutoff valves to prevent discharge when there is no call for producing treated water. Reverse osmosis water treatment systems shall be listed to meet NSF58.

**406.4 Drinking Water Treatment Systems.** Drinking water treatment systems shall be listed to WQA/ASPE S-803.

#### **407.0 Commercial Food Service.**

**407.1 Ice Makers.** Ice makers shall be air cooled and shall be in accordance with Energy Star for energy use for commercial ice machines. Ice makers producing cubed-type ice shall not exceed 20 gallons of water per 100 pounds of ice produced. Ice makers producing nugget and flake ice shall not exceed 14 gallons of water per 100 pound of ice produced.

**407.2 Food Steamers.** Boilerless type steamers shall not consume more than 2.0 gallons (7.6 L) per compartment. Boiler type steamers shall not consume more than 1.5 gallons (5.7 L) per pan per hour.

**407.3 Combination Ovens.** Combination ovens shall not use water in the convection mode except when utilizing a moisture nozzle for food products in the oven. The total amount of water used by the moisture nozzle in the convection mode shall not exceed a half a gallon per hour per oven cavity. When operating in the steamer mode, combination ovens shall not use more than 1.5 gallons (5.7 L) per hour per pan.

**407.4 Grease Interceptors.** Grease interceptor maintenance procedures shall not include post-pumping/cleaning refill using potable water. Refill shall be by connected appliance accumulated discharge only.

**407.5 Dipper Well Faucets.** Where dipper wells with a permanent water supply are installed, the water supply to a dipper well shall have a shutoff valve and flow control. The flow of water into a dipper well shall be limited by Section 407.5.1 or Section 407.5.2.

**407.5.1 Maximum Continuous Flow.** Water flow shall not exceed the water capacity of the dipper well in one minute at supply pressure of 60 psi (414 kPa), and the maximum flow shall not exceed 0.2 gpm (0.8 L/m) at