WATER EFFICIENCY AND SANITATION STANDARD (WE-STAND)

TECHNICAL COMMITTEE MEETING

IAPMO WORLD HEADQUARTERS, ONTARIO, CA.

APRIL 9-10, 2019

Water Efficiency and Sanitation Standard (WE-Stand)
Technical Committee Meeting

IAPMO World Headquarters, Ontario, CA.
April 9-10, 2019 – 8:00 a.m.

AGENDA

April 9, 2019 – 8:00 a.m.

1. Call to Order
2. Chairman Comments
3. Announcements
4. Self-Introductions
5. Review and Approval of Agenda
6. Review and Discussion of Task Group Reports and Change Proposals to the Water Efficiency and Sanitation Standard (WE-Stand)
7. Adjournment for the day

April 10, 2019 – 8:00 a.m.

1. Call to Order
2. Chairman Comments
3. Announcements
4. Continuation of Review and Discussion of Change Proposals to the Water Efficiency and Sanitation Standard (WE-Stand)
5. Other Business
6. Next Scheduled Meeting
7. Adjournment

TENTATIVE ORDER OF DISCUSSION
Proposed Changes to the 2020 WE-Stand

The following is the tentative order of discussion on which the proposed changes will be discussed at the WE-Stand Technical Committee Meeting. Proposed changes that are grouped together are those that are separated by lines. Indented proposed changes are those being discussed out of numerical order.

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Alternate Water Sources Task Group Report to the WE-Stand Technical Committee

Prepared By: Dan Cole, WE-Stand Secretariat

Chairman: Jim Kendzel

Members: Laura Allen, Carlos Borja, Taylor Chang, Raman Chauhan, Paula Kehoe, Pat Lando, Markus Lenger, Dave Mann, Cambria McLeod, John Ossa, Tom Pape, Sandy Robertson, Neal Shapiro, Matt Sigler, Lakshmanan Viswanathan, Joelle Wirth

Scope of the Task Group: To research technologies and develop provisions for on-site treatment for storm water and blackwater catchment systems for non-potable and potable reuse, and the appropriate disinfection and testing requirements for these systems according to the end use. Additionally, definitions for different types of alternate water sources need to be distinguished for better understanding across the industry.

Activity: The Task Group met four times via GoToMeeting from November 2018 through January 2019. Draft outlines for blackwater and stormwater provisions were prepared to initiate the work. During the first meeting, a working group was chosen to incorporate provisions from the National Blue Ribbon Commission for Onsite Non-potable Water Systems into the draft outline and present it to the Task Group. The smaller working group included Neal Shapiro, Paula Kehoe, and Taylor Chang.

Another working group was chosen to develop provisions for commissioning (functionality check of the system), and maintenance and inspection and present them to the Task Group. This group included Taylor Chang, Paula Kehoe, and John Ossa. The Task Group also discussed the water quality tables and how the required log reduction was to be achieved. Paula Kehoe provided a document, *Non-potable Water Program Guidebook: A Guide for Implementing Onsite Non-potable Water Systems in San Francisco*, that explains the water quality tables for blackwater and Stormwater treatment. It contains an explanation of Log Reduction Targets (LRTs) and how to design an onsite non-potable water system to meet the LRTs.

The Task Group discussed whether the Tables in ISO 30500 Non-Sewered Sanitation Systems should be used in the draft proposal for blackwater treatment rather than those derived from the National Blue Ribbon Commission. The Task Group did consider ISO 30500 as a viable option, but the majority decision was that the Tables in the National Blue Ribbon Commission are more stringent.

There was considerable discussion as to how the term blackwater was to be defined, how it was to be distinguished from gray water, and whether to include kitchen sink waste. The majority decision was to define blackwater in terms of toilet and kitchen sink waste. Two Task Group members dissented from the term blackwater and proposed an alternate word, sewage instead. The Task Group approved retaining the term blackwater as defined in the proposal.

Two final drafts for blackwater and stormwater treatment were prepared with technical substantiation and recommended by the Task Group by majority vote for proposal submissions (Blackwater: 5 approved, 3 opposed, 1 abstention. Stormwater: 7 approved, 2 opposed). The Task Group Chair submitted the proposals for the WE-Stand Technical Committee consideration.

Commercial Food Services Task Group Report to the WE-Stand Technical Committee

Prepared By: Dan Cole, WE-Stand Secretariat

Chairman: Markus Lenger

Members: Bob Boulware, Casey Furlong, Nick Lopez, Shannon Murphy, Tom Pape, IAPMO Staff
Tom Palkon participated representing ASSE.

Scope of the Task Group: To research new water conservation technologies for the commercial food service industry, including water treatment systems (POU reverse osmosis, water softeners, etc.), dipper well alternatives, frozen carbonated beverage machines, compressed air boosted pre-rinse spray valves, and biological and composting technologies for FOG food waste management. The task group will explore better solutions for exempting the requirement of tempering water for combination ovens, commercial food steamers, commercial dishwashers, and ware washers while also considering the impact of hot water on grease interceptor performance.

Activity: The Task Group met four times via GoToMeeting from November 2018 through January 2019. The several technologies the Task Group researched are: R.O. system efficiency, Dipper Well alternatives, tempering water for high temperature waste, frozen carbonated beverage machines, compressed air boosted pre-rinse spray valves, and FOG technologies.

The Task Group reviewed an ASSE draft standard for Reverse Osmosis Water Efficiency (1086) and recommended it to be included in the current RO provisions for system efficiency requirements. The draft standard will be published prior to the Public Comment period for WE-Stand.

The Task Group decided not to develop provisions for dipper well alternatives that do not use a permanent water supply. Instead, the existing provisions were amended to require metered or sensor activated flows where a permanent water supply is used. The intent is to prohibit continuous flowing dipper wells.

In discussing the use of tempering water to cool high temperature waste from commercial food equipment, the Task Group agreed to prohibit the use of potable water and to allow the use of heat recovery technology.

The task group recommended a water consumption efficiency requirement for water-cooled frozen beverage machines by interlocking water consumption with compressor operation and to limit condensing water use by controlling the minimum discharge temperature before it can be wasted to drain.

Air blade technology as an alternative to Pre-Rinse Spray Valves using compressed air was considered. The Task Group decided not to pursue this technology for inclusion in WE-Stand for the following reasons: The technology is still patent-pending; A standard has not yet been developed for this technology; and there are safety precautions that need to be considered (projectiles, splash guard, compressed air safety provisions).

The new FOG technology of *wet digestors* was researched by the Task Group. Recommendations were made prohibiting wet digestors to discharge to a grease interceptor unless designed for that purpose. The Task Group further researched the effect of high temperature waste from commercial dishwashers discharging into grease interceptors on the efficient separation of FOG waste. The Task Group recommended temperature limitations for wastes entering the grease interceptor.

The Task Group concluded their research with the development of several proposals to be considered by the Technical Committee. The Chairman of the Task Group was chosen to submit the proposals.

NonTraditional Toilet Task Group Report to the WE-Stand Technical Committee

Prepared By: Dan Cole, WE-Stand Secretariat

Chairman: Pat Lando

Members: Laura Allen, Markus Lenger, Dave Mann, Cambria McLeod, Ed Osann, Fraser Sneddon, Joelle Wirth

Scope of the Task Group: To develop an informative appendix for the Composting Toilet Inspection Checklist, and to investigate non-traditional toilets in ISO 30500 Non-Sewered Sanitation Systems for possible inclusion in WE-Stand.

Activity: The Task Group met five times via GoToMeeting from November 2018 through January 2019. The Task Group completed both items contained within the scope of work.

The Inspection Checklist for the Appendix was initially developed last code cycle and was remanded to a Task Group to be created for the next cycle. This Task Group made several revisions resulting in a more suitable checklist for an inspector to use. As the Task Group reviewed the checklist, they also noted several sections in Chapter 4 for composting toilets that need revision.

The Task Group considered the merit of including ISO 305000 in WE-Stand. Approving the merit, the Task Group developed a new section for non-sewered sanitation systems.

The Task Group recommended the Chair to submit proposals for the Inspection Checklist as an Appendix addition, a new section for non-sewered sanitation systems, and additional revisions for Chapter 4 composting toilets and urine diversion systems.

Premise Water Supply System Design Task Group Report to the WE-Stand Technical Committee

Prepared By: Dan Cole, WE-Stand Secretariat

Chairman: Gary Klein

Members: Carlos Borja, Steve Buchberger, Mike Cudahy, Rich Houle, Darin Johnson, Jim Kendzel, John Koeller, Pat Lando, Markus Lenger, Nick Lopez, Dave Mann, Cambria McLeod, Tom Pape, Jonah Schein, Matt Sigler, Lakshmanan Viswanathan

Scope of the Task Group: To investigate premise plumbing water supply system design provisions that would result in improved water quality and water- and/or energy-efficiency performance. Strategies to investigate include:

- Right pipe sizes and lengths for the application
- Strategically locating fixtures and appliances near each other and to the water heater,
- Piping strategies to prevent or minimize stagnation and residence time
- Velocity minimums and maximums for water quality control
- Technologies for leak detection devices.
- Technologies for water/energy efficiency
- Water Temperature (water heater, tap temps, cold water, inline temps; hot water system)
- Consider source water quality – outside the scope of the task group
- Drain water heat recovery/heat mining

Activity: The Task Group met four times via GoToMeeting from November 2018 through February 2019. The Task Group discussed the Scope of work and decided to expand the number of bullet points from the original scope to identify more particularly the system design they will be investigating. The Task Group decided to omit from the scope of premise water supply system design, fire suppression systems, types of material affecting water quality, water treatment technologies, and municipal water quality entering the building. As a result, a working definition of premise water supply system design was drafted.

The Task Group spent considerable time discussing Time-to-Tap performance criteria. A working group drafted a chart with fixture types and time-to-tap recommendations. Once the time-to-tap criteria is known, the length of pipe can be determined by calculation using the length of pipe per volume of piping tables in Chapter 7 of WE-Stand.

A working outline for Water Supply System Design was drafted. The Task Group agreed that this outline is better suited for a Guidance Appendix in WE-Stand. This is a work in progress and is unique to the issues surrounding plumbing system design for water efficiency. The working draft is provided for feedback from the Technical Committee and for direction on how to further develop this Guide.

Premise Water Supply System Design Guide [draft outline]

101.0 General.

101.1 Scope. The provisions of this section shall apply to the distribution of potable water supply from the water meter to point of use within the building for safe and efficient plumbing performance. The distribution system includes piping and fittings, appurtenances, plumbing fixtures and appliances, and water treatment equipment. It does not include non-potable alternate water systems.

201.0 Plumbing Fixture and Appliance Location. (TG Note: Design around the Core. Compact system Design. Provisions/strategy for water efficiency and water quality)

301.0 Hot Water System Design. (TG Note: provisions for efficient delivery and protecting water quality)

301.1 Time to Tap Performance Criteria. Upon activation of the hot water control, the time for the hot water design temperature to reach the outlet of the fixture fitting shall be in accordance with Table 301.1.

Table 301.1
Maximum Hot Water Time to Tap Table at Fixture Flow Rate

Fixture Fittings and Appliances	Time
Lavatory faucets, other than residential Metering faucet	5 seconds
Kitchen faucets Lavatory faucets residential Dishwashers, residential[1] Clothes washing machines, residential[1] Laundry faucets Showers	15 seconds
Other fixture fittings and appliances	Design fit for purpose

[1]. The time to tap for residential dishwashers and residential clothes washing machines shall be inferred by having a fixture branch with a volume not greater than the volume that results in time being not longer than 10 seconds.

TG Note: Need a formula to translate time-to-tap into size of pipe and length of run to achieve the time to tap criteria. Consider using Tables 703.7.1 and 703.7.2 in Chapter 7 of WE-Stand for sizing pipe and length of run per volume of water to achieve the time to tap criteria. Include a guidance statement for other fixtures.

301.2 Location of Sources of Hot Water. Location of sources of hot water shall meet time to tap criteria using water heaters, circulation loops or heat trace methods.

301.2.1 Hot Water Temperature Control. (TG Note: recommend system temperature and where and how to control temperature at point of use for best water quality)

301.3 Hot Water Circulation. (TG Note: is there a water efficient/inefficient way of designing a circulation system? Does hot water circulation affect water quality? How? And how to prevent?)

401.0 Velocity Requirements. (TG Note: min and max? Issues: Water hammer, corrosion, cavitation. Is scouring a concern? What is scouring? At what velocity does scouring take place? Can scouring affect biofilm?)

TG Note: Optimize pipe sizing to meet velocity requirements. Consider minimum and maximum pipe velocity. Recommended the minimum flow rate of 2 ft/s to avoid laminar flow range and stay in the transitional phase between laminar and turbulent flow condition. The maximum recommended velocity should be in accordance with the material limitations.

501.0 System Pipe Diameter. (TG Note: Is there a way to determine the relation between diameter and stagnation and residence time? Diameter based on predicted peak flow – water demand calculator. Minimum diameter and controlling potential issues – high velocity, high friction loss)

601.0 Pressure Loss Design.

701.0 Pipe Material. (TG Note: impacts on water quality; susceptibility to microbial biofilm; effect on disinfectant; water quality impacts on pipe material causing corrosion and oxidation).

801.0 Water Quality Monitoring.

801.1 Point of Entry.

801.2 Leak Detection.

801.3 High-temperature Alarm.

Definitions

Premise Water Supply System Design. The distribution of the potable water supply from the water meter to point of use within the building. The distribution system includes piping and fittings, appurtenances, plumbing fixtures and appliances, and water treatment equipment. It does not include non-potable alternate water systems.

Water Efficiency and Conservation Task Group Report to the WE-Stand Technical Committee

Prepared By: Dan Cole, WE-Stand Secretariat

Chairman: Tom Pape

Members: Raman Chauhan, Greg Chick, Mike Cudahy, Rich Houle, Jim Kendzel, Gary Klein, John Koeller, Pat Lando, Markus Lenger, Brent Mecham, Ed Osann, John Ossa, Jonah Schein, Matt Sigler, Stephanie Tanner, Eric Truskoski, Lakshmanan Viswanathan

Scope of the Task Group: to investigate the water efficiency performance for the following:

- Different kinds of water heaters and water heating control strategies
- Pool covers that allow the collection of rainwater to be used as makeup water.
- The task group will also research the efficiency performance of sand filters versus cartridge filters.
- Landscape plant material that reduces water usage. The task group will also review landscape provisions in WE-Stand for updates.
- Using the performance paths in WERS and HERS H20 to compare with the prescriptive path in WE-Stand.

Activity: The Task Group met four times via GoToMeeting from November 2018 through January 2019. The Task Group reached out to representatives of WERS and HERS H2O to explain to the Task Group the performance criteria for each index. Mike Collignon from Green Builder Coalition did a presentation on WERS, and Ryan Meres from RESNET did a presentation on HERS H2O. Both presentations were informative and led the Task Group to decide that conducting a comparison is too premature since the HERS document is not yet a published standard.

The Task Group could not find sufficient information with respect to water efficiency identifiers for water heaters or water heating control strategies promoting water efficiency. Most studies are on comparative cost or energy or overall LCA. This did raise the awareness of the water-energy nexus with respect to water heaters and connecting the water efficiency identifiers to energy. However, the issue is larger than water heaters. The source of energy used for heating water onsite will have an impact on water consumed off-site (e.g. approximately for every gallon of water, 1/3 gallon is evaporated when generating electricity by electromechanical generators). The Task Group research was inconclusive on this topic.

Regarding the efficiency performance of sand versus cartridge filter, the Task Group decided to take no action on recommending the efficiency of one filter over another because of the lack of data. There is no efficiency baseline to make a comparison. The Task Group did recommend a new section on backwash water reuse as an alternate water source. This recommendation was submitted as a proposal by the Chair of the Task Group. The Task Group also recommends a revision for pool covers to allow the collection of rainwater into the pool.

The Task Group agreed to address the topic of plant material in the landscape provisions. Whereas the existing provisions required the AHJ to establish the type of plant material used in landscaping, the Task Group is recommending a percentage of the landscape area that can be irrigated. The Task Group also reviewed the existing landscape provisions in WE-Stand and recommends several update revisions. These will be submitted as proposals by the Chair of the Task Group.

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Delete text
Section Number:	209.0
Proposed Text:	**209.0 Gray Water.** Untreated waste water that has not come into contact with toilet waste~~,~~ ~~kitchen sink waste, dishwasher waste~~ or similarly contaminated sources. Gray water includes waste water from bathtubs, showers, lavatories, clothes washers and laundry tubs. Also known as grey water, graywater, and greywater.
Problem Statement:	15 states include kitchen sink water in their definition of gray water, and from the global perspective kitchen sink water is typically included. Since the inclusion/exclusion of kitchen sink water varies state-by-state a national standard should be more inclusive in the definition of gray water, allowing individual states to restrict the definition if they wish. Notably, food and grease from kitchen sink water does not contaminate the water "similarly" as does feces from a toilet. When considering the increased risk of including kitchen sink water, food borne pathogens are potentially in the water (and they are not typically found in other sources of gray water). Importantly, kitchen water does not introduce new pathogens into the system, any pathogens found in the water are already in the kitchen, on the counters, and on the hands of the user (think of washing a raw chicken in the sink). Distributing this water subsurface in the landscape is no more a risk than having the pathogens in the kitchen itself, and does not warrant the prohibition of the water as potential for reuse. From a design perspective, kitchen sink water is often undesirable due to fats, oils, and grease, but this doesn't mean the water should be excluded from the basic definition of gray water. There are some types of systems that successfully reuse kitchen water for subsurface irrigation. (To reference which states include kitchen water in their graywater definition please see Treatment, Public Health, and Regulatory Issues Associated with Graywater Reuse by the WateReuse Research Foundation)
Referenced Standards:	

WE-Stand 2020 – (214.0) Item # 005

Name:	Kelsey Jacquard
Organization:	Hunter Industries
Recommendation:	Revise text
Section Number:	214.0
Proposed Text:	**Low Flow Emitter**. Low flow irrigation emission device designed to dissipate water pressure and discharge a small uniform flow or trickle of water at a constant flow rate. To be classified as a Low Flow Emitter: drip emitters shall discharge water at less than ~~4 gallons (15 L) 6~~.3 gallons (24 L) per hour per emitter; micro-spray, micro-jet and misters shall discharge water at a maximum of 30 gallons (113 L) per hour per nozzle.
Problem Statement:	It is recommended to change the maximum flow for drip emitters from 4 GPH to 6.3 GPH to match the ASABE/ICC 802-2014 definition of a drip emitter. Section 415.7 in the 2017 We-Stand document refers to the ASABE/ICC 802-2014 standard compliance for low flow irrigation, which defines the drip emitter as having a maximum of 6.3 GPH.
Referenced Standards:	ASABE/ICC 802-2014

WE-Stand 2020 – (402.3.1) Item # 007

Name:	Jay Peters
Organization:	Codes and Standards International
Representing:	Falcon Waterfree Technologies
Recommendation:	Revise text
Section Number:	402.3.1, 223.0
Proposed Text:	**402.3.1 Nonwater Urinals**. (text remains the same). **Exception:** Urinals with drain cleansing action or ~~N~~nonwater urinals used as a part of a composting toilet system. New corresponding definition being proposed: **223.0** **Urinal with Drain Cleansing Action.** A urinal that conveys waste into the drainage system without the use of water for flushing and automatically performs a drain-cleansing action after a predetermined amount of time.
Problem Statement:	Urinals with drain cleansing action do not use water to flush the fixture but are connected to a water supply and designed to specifically cleanse the drain so that a connection of an upstream fixture to the drainline is not necessary. It already has a water supply connected and does need an additional water supply. The UPC has assigned them 1 WSFU and 1 DFU - the same as a lavatory or bidet. A definition, identical to the UPC definition, is being proposed for this item.
Referenced Standards:	

WE-Stand 2020 – (402.3.2) Item # 008

Name:	Jay Peters
Organization:	Codes and Standards International
Representing:	Falcon Waterfree Technologies
Recommendation:	Add text
Section Number:	402.3.2
Proposed Text:	**402.3.2 Urinals with Drain Cleansing Action.** Urinals with drain cleansing action shall comply with ASME A112.19.19 and shall be cleaned, maintained and installed in accordance with the manufacturer's installation instructions. Urinals with drain cleansing action are exempt from the water supply rough-in and upstream drainage fixture connection requirements in section 402.3.1.
Problem Statement:	Urinals with Drain Cleansing Action do not require additional water supply rough-ins or an upstream fixture attached to the drainline because they already have a water supply connected to cleanse the drainline.
Referenced Standards:	

WE-Stand 2020 – (223.0) Item # 006

Name:	Jay Peters
Organization:	Codes and Standards International
Representing:	Falcon Waterfree Technologies
Recommendation:	Add text
Section Number:	223.0
Proposed Text:	**Urinal with Drain Cleansing Action.** A urinal that conveys waste into the drainage system without the use of water for flushing and automatically performs a drain-cleansing action after a predetermined amount of time.
Problem Statement:	This proposal is needed to correspond with another proposal for 402.3.2. It also correlates with the Uniform Plumbing Code. It is identical to the 2018 UPC.
Referenced Standards:	

WE-Stand 2020 – (402.4.1) Item # 009

Name:	Gary Klein
Organization:	Gary Klein and Associates, Inc.
Recommendation:	Add text
Section Number:	402.4.1
Proposed Text:	**402.4.1 Cold-start Function.** Single-lever residential kitchen faucets shall be equipped with a cold-start function.
Problem Statement:	A very large fraction of faucet events are extremely small, both in terms of flow rate and in terms of volume. For example, a recent analysis of the hot water use patterns used for Title 24, Part 6 (Energy) compliance, found that 72% of the faucet events were less than 1.0 gpm and 51% were less than 0.8 gpm. The vast majority of these events drew less than 1 gallon from the water heater. Those faucet events that draw hot water generally deliver building temperature water to the user, not the hot water that was "requested". This is due to the volume in the hot water piping being larger than the hot water event can clear. Cold start function faucets only "request" hot water when the user moves the single lever intentionally left-of-center (or similar for other single lever designs). Putting the valve straight up or to the right delivers building temperature water, which is what the user was getting in the first place. When hot water is desired, the user moves the lever to the left and hot water will eventually arrive, depending on the volume in the piping from the source of hot water to that faucet.
Referenced Standards:	

Name:	Gary Klein
Organization:	Gary Klein and Associates, Inc.
Recommendation:	Add text
Section Number:	402.5.1.2
Proposed Text:	**402.5.1.2 Cold-start Function.** Single-lever lavatory faucets shall be equipped with a cold-start function.
Problem Statement:	A very large fraction of faucet events are extremely small, both in terms of flow rate and in terms of volume. For example, a recent analysis of the hot water use patterns used for Title 24, Part 6 (Energy) compliance, found that 72% of the faucet events were less than 1.0 gpm and 51% were less than 0.8 gpm. The vast majority of these events drew less than 1 gallon from the water heater. Those faucet events that draw hot water generally deliver building temperature water to the user, not the hot water that was "requested". This is due to the volume in the hot water piping being larger than the hot water event can clear. Cold start function faucets only "request" hot water when the user moves the single lever intentionally left-of-center (or similar for other single lever designs). Putting the valve straight up or to the right delivers building temperature water, which is what the user was getting in the first place. When hot water is desired, the user moves the lever to the left and hot water will eventually arrive, depending on the volume in the piping from the source of hot water to that faucet.
Referenced Standards:	

WE-Stand 2020 – (205.0) Item # 002

Name:	Gary Klein
Organization:	Gary Klein and Associates, Inc.
Recommendation:	Add text
Section Number:	205.0
Proposed Text:	**Cold-start Function.** Single-lever faucets that normally discharge cold water. To obtain hot water, the user must intentionally move the lever to the portion of the valve that allows for the discharge of hot water.
Problem Statement:	This definition is needed to support the proposals for cold-start function lavatory and kitchen faucets.
Referenced Standards:	

WE-Stand 2020 – (402.5.2) Item # 011

Name:	Tim Keane
Organization:	Legionella Risk Management
Recommendation:	Add text
Section Number:	402.5.2
Proposed Text:	**402.5.2 Lavatory Faucets in Other Than Residences, Apartments, and Private Bathrooms in Lodging Facilities.** Lavatory faucets installed in bathrooms of buildings exposed to walk-in traffic 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.
Problem Statement:	Add exposed to walk-in traffic. The intent of these water saving efforts are to have low flow at high use fixtures. Low flow at low use fixtures creates a very high legionella risk. This section references ASME A112.18.1. The exact wording in this standard is "Public lavatory fitting - a fitting intended to be installed in non-residential bathrooms that are exposed to walk-in traffic."
Referenced Standards:	ASME Standard A112.18.1

WE-Stand 2020 – (402.6.1) Item # 012

Name:	Thomas Pape
Organization:	BMP
Representing:	Alliance for Water Efficiency
Recommendation:	Revise text
Section Number:	402.6.1
Proposed Text:	**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~~ 2600 square inches (~~1.161~~ 1.677 m^2). For each increment of 1800 square inches (1.161 m^2) of floor area thereafter or any 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.
Problem Statement:	There seems to be an ongoing problem of "or any part thereof" entering this provision without ample notice. The Alliance for Water Efficiency has a long-standing agreement with showerhead manufacturers to limit flow in typical bath/shower combination fixtures to 2.0 GPM in green codes and standards. When we agreed to the "1800 sq. in., the "or any part thereof" was not included. It is unreasonable for two people to shower in 1801 sq. in. space without genital contact.
Referenced Standards:	

Name:	Markus Lenger
Organization:	CleanBlu Innovations Inc
Representing:	Chairman for WE-Stand Commercial Food Services Task Group
Recommendation:	Revise text
Section Number:	402.9
Proposed Text:	**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.~~
Problem Statement:	The EPA sunsetted the WaterSense Specification on January 1, 2019. The DOE regulations will be in effect using ASTM F2324.
Referenced Standards:	

WE-Stand 2020 – (402.12) Item # 014

<table>
<tr><td>Name:</td><td>Robin Evaldsson</td></tr>
<tr><td>Organization:</td><td>Orbital Systems</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Recommendation:</td><td>Add text</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Section Number:</td><td>402.12, 220.0, Table 901.1</td></tr>
<tr><td>Proposed Text:</td><td><u>402.12 Recirculating Shower Systems</u><u>. Recirculating shower systems shall comply with IAPMO IGC330.</u>
402.<s>12</s><u>13 </u>Installation. (renumber section, text remains the same)

220.0 -R-
<u>Recirculating Shower Systems.</u><u> A water recirculating system that assesses shower water at the shower pan. The dirty water is diverted to the drain and the rest is filtered, disinfected, reheated and reused.</u>

TABLE 901.1
REFERENCED STANDARDS

<table>
<tr><th>STANDARD NUMBER</th><th>STANDARD TITLE</th><th>APPLICATION REFERENCED SECTIONS</th></tr>
<tr><td><u>IAPMO IGC 330-2018</u></td><td><u>Recirculating Shower Systems</u></td><td><u>Fixtures 402.12</u></td></tr>
</table>
</td></tr>
<tr><td>Problem Statement:</td><td>Recirculating showers are new to most plumbers and code officials. IAPMO IGC 330 was initially published in 2016 and was revised and republished in 2018. Recirculating showers compliant with IGC 330 conserve water and energy. This Standard covers portable and stationary recirculating shower systems intended for new and retrofit residential and commercial applications and specifies requirements for materials, physical characteristics, performance testing, and markings. This proposed language will guide the manufacturers and AHJ to ensure that safe and reliable systems for shower recirculation are being implemented.</td></tr>
<tr><td>Referenced Standards:</td><td>IAPMO IGC330 -2018</td></tr>
</table>

WE-Stand 2020 – (403.0-403.9.13) Item # 015

Name:	David Mann
Organization:	Self
Recommendation:	Delete text/Add text
Section Number:	403.0-403.9.13
Proposed Text:	Move Sections 403.0 through 403.9.13 into their own Chapter. The Chapter shall be titled **COMPOSTING TOILET AND URINE DIVERSION SYSTEMS**. Renumber remaining Sections of Chapter 4. Also, renumber remaining Chapters.
Problem Statement:	Composting toilet systems seem to be somewhat hidden in Chapter 4. Composting Toilet and Urine Diversion Systems should be its own Chapter as is Alternate Water Sources for Nonpotable Applications and Nonpotable Rainwater, Catchment Systems.
Referenced Standards:	

WE-Stand 2020 – (403.6.1) Item # 016

Name:	Pat Lando
Organization:	Recode
Representing:	Chairman for WE-Stand NonTraditional Toilets Task Group
Recommendation:	Revise text
Section Number:	403.6.1
Proposed Text:	**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. The new owner is to be notified of proper operations and humus shall be re-tested after its first treatment period and a record retained.~~
Problem Statement:	The removal of the third sentence of this paragraph was based upon the sentence being overly burdensome and restrictive. The Notice of Transfer process is overseen and administered by the AHJ.
Referenced Standards:	

Name:	Pat Lando
Organization:	Recode
Representing:	Chairman for WE-Stand NonTraditional Toilets Task Group
Recommendation:	Delete text
Section Number:	403.8.3.1
Proposed Text:	~~**403.8.3.1 Structure.** Commodes shall be designed to support users.~~
Problem Statement:	Supporting users is unenforceable. NSF 41 (5.2.1) requires a 136 ± 2 kg (300 ± 5 lb) static load test for commodes.
Referenced Standards:	

WE-Stand 2020 – (403.8.4.1.4, 403.8.4.1.5, 403.9.11.5) Item # 018

Name:	Pat Lando
Organization:	Recode
Representing:	Chairman for WE-Stand NonTraditional Toilets Task Group
Recommendation:	Revise text
Section Number:	403.8.4.1.4, 403.8.4.1.5, and 403.9.11.5
Proposed Text:	**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 an audible and visual 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^2) (1465 kg/m^2) 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 an audible and visual high-water alarm. **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 an audible and visual high-water alarm. ~~The alarm shall report when 80 percent volume is reached.~~
Problem Statement:	An audible and visual notice to replace "report" is necessary as both audible and visual provide additional measures that allow for better protection of public health and the environment. The purpose for an alarm is to notify the occupant(s) that they are nearing capacity and need to plan to have the tank pumped.
Referenced Standards:	

WE-Stand 2020 – (403.8.4.1.7, 403.8.4.5) Item # 019

Name:	Pat Lando
Organization:	Recode
Representing:	Chairman for WE-Stand NonTraditional Toilets Task Group
Recommendation:	Revise text
Section Number:	403.8.4.1.7 and 403.8.4.5
Proposed Text:	**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~~ vermin and insect infiltration and be protected against unauthorized human entry. **403.8.4.5 Vermin (Rodent) ~~p~~Proofing**. The compost processor shall be protected to prevent the entrance of ~~insects, birds, or rodents~~ vermin and insects. No unsecured opening other than vents, drainage, or commode may exceed ½-inch in the least dimension.
Problem Statement:	Replace the existing term of rodent with vermin. The term "vermin" is used to refer to a wide scope of organisms, including rodents, cockroaches, termites, and bed bugs. ... Pigeons, which have been widely introduced in urban environments, are also sometimes considered vermin. Some varieties of snakes and arachnids may also be referred to as vermin.
Referenced Standards:	

WE-Stand 2020 – (403.9.2) Item # 020

Name:	Pat Lando
Organization:	Recode
Representing:	Chairman for WE-Stand NonTraditional Toilets Task Group
Recommendation:	Revise text
Section Number:	403.9.2
Proposed Text:	**403.9.2 Material Requirements**. Material used for urine diversion shall be corrosive-resistant such as plastic, fiberglass, porcelain, or other recycled materials ~~stainless steel or non-metallic pipe. Concrete piping is prohibited~~.
Problem Statement:	Material requirements needed inclusion of suitable materials that are commonly used for urine diversion.
Referenced Standards:	

Name:	Pat Lando
Organization:	Recode
Representing:	Chairman for WE-Stand NonTraditional Toilets Task Group
Recommendation:	Add text
Section Number:	404.0
Proposed Text:	**404.0 Non-Sewered Sanitation Systems.** **404.1 General.** Non-sewered sanitation systems shall comply with ISO 30500. **404.2 Installation**. The installation of non-sewered sanitation systems shall be in accordance with the manufacturer's installation instructions and Section 404.2.1 through Section 404.2.5. **404.2.1 Operating Conditions**. A non-sewered sanitation system in either a conditioned or unconditioned space shall be installed where the ambient temperature, ambient humidity, and altitude (atmospheric pressure) are in accordance with the manufacturer's installation instructions or product listing. **404.2.2 Clearances for Servicing and Maintenance**. A non-sewered sanitation system shall be located to permit access and sufficient clearance for service and maintenance. Unless otherwise specified by the manufacturer's installation instructions, not less than 30 inches in depth, width, and height of working space shall be provided at any access panel. **404.2.3 Backflow Prevention**. A domestic water supply connection to a non-sewered sanitation system shall be protected in accordance with the plumbing code. **404.2.4 Effluent Storage**. Any container or vessel for the storage of effluent discharged from a non-sewered sanitation system and not integral to such system shall be installed in accordance with the plumbing code. **404.2.5 Systems Employing Combustion**. A non-sewered sanitation system employing combustion shall comply with the mechanical code. **Exception**: A non-sewered sanitation system listed for unvented use. **404.3 Operation and Maintenance Manual**. Non-sewered sanitation systems shall have an operation and maintenance manual provided by the manufacturer. **404.4 System Output**. The use or disposal of all substances exiting the non-sewered sanitation system shall be determined by the Authority Having Jurisdiction. **Add Definitions to 205.0 and 216.0:** **Conditioned Space.** An area, room, or space normally occupied and being heated or cooled for human habitation by any equipment. **Non-sewered Sanitation System**. A prefabricated integrated sewage treatment unit that is not connected to a public sewer or private sewage disposal system. **Add new text to Section 304.2:** **304.2 Connections to Plumbing System Required.** Plumbing fixtures, drains, appurtenances, and appliances, used to receive or discharge liquid wastes or sewage, shall be connected properly to the drainage system of the building or premises, in accordance with the requirements of the plumbing code and this standard. **Exceptions:** (1) remains the same (2) Non-sewered sanitation systems.

	Add new standard to Table 901.1, REFERENCED STANDARDS **STANDARD NUMBER-YEAR** | **STANDARD TITLE** | **REFERENCED SECTION** ISO 30500:2018 | Non-Sewered Sanitation Systems - Prefabricated Integrated Treatment Units - General Safety and Performance Requirements for Design and Testing | 216.0, 404.0
Problem Statement:	This proposal covers the essential considerations that a building official must assess when a non-sewered sanitation system (as defined) is installed in a building. To facilitate commercialization of hi-tech toilets and their acceptance by national regulatory bodies, an ISO standard was adopted in 2018 to establish the key performance attributes of non-sewered sanitation systems (NSSSs). Standard 30500, "Non-sewered sanitation systems - Prefabricated integrated treatment units - General safety and performance requirements for design and testing," sets performance requirements for solid and liquid outputs, odor, noise, air emissions, materials, safety, marking, and ergonomics, together with relevant test procedures for measuring the attainment of these requirements. Designed for operation without a sewer connection and, in many cases, without a dedicated water supply, NSSSs are anticipated to meet critical public health needs in developing countries with limited water and wastewater infrastructure. However, this new standard carries important implications for water and wastewater management and utility service in North America as well. From national parks to suburban shopping malls to net zero homes, high-tech toilets meeting the new ISO standard could find uses that upend our approach to sanitation and our expectations about future water demands and the placement and capacity of water-related infrastructure. In 2011, the Bill & Melinda Gates Foundation launched the "Reinvent the Toilet Challenge" to bring new technology to bear to achieve "sustainable sanitation solutions." The target is a device that provides complete and effective treatment of human sanitary waste, unconnected to any sewer or drainage network and with minimal inputs of water and energy. Eight teams have received foundation support to develop prototypes for lab testing, field trials, and eventual commercialization. Among these early devices, three broad pathways for treatment technology have been applied - electro-chemical, biological, and combustion - and in some cases, combinations of these in the same device. The provisions in this proposal address the considerations that must be taken into account by building officials regarding the placement and installation of NSSSs in buildings. The proposal would permit (but not require) the installation of a NSSS listed to the ISO standard, providing an exception to the general requirement that sanitation devices be connected to the building drainage system. Criteria for the functioning of the unit for its intended purpose are established by the ISO standard, and do not need to be repeated in code language in the WE-Stand document. Certain key protections, such as backflow prevention, proper ventilation of combustion-based units, and proper siting of any storage tanks external to the unit are each specified in the proposal. The clearance requirements in Section 404.2.2 correspond with the basic requirements found in the Uniform Mechanical Code, Section 304.1. Considerations of the use and disposal of outputs of the system are specifically referred to an AHJ, which would most likely be a health department. With reinvented toilets now on the cusp of commercialization, the widespread use of toilets without water and sewer connections carries profound implications for US utilities and builders. While much is still unknown about their cost, maintenance, reliability, and even the business model for their installation and service, forward-looking communities will want to be prepared to ensure the safe installation and use of this promising new technology, which will soon be available. This proposal lays the necessary groundwork for code officials to inspect and approve their installation.
Referenced Standards:	ISO 30500

WE-Stand 2020 – (406.2) Item # 022

Name:	Tim Keane
Organization:	Legionella Risk Management, Inc.
Recommendation:	Add text
Section Number:	406.2
Proposed Text:	**406.2 Non-residential Water Softeners**. Non-residential water softeners shall be sized for the intended application. The water softener shall regenerate every 24 hours but no more than every 72 hours and reduce the hardness to not less than 2 grains per gallon. **406.2.1 Sizing**. Water softener sizing shall be based on peak water demand determined by the total number of fixture units and not as continuous supply demand. (renumber the remaining sections)
Problem Statement:	Oversizing softeners results in larger volumes of stored water in the resin tank, longer retention times, greater reduction in disinfectant levels, larger volumes of water used in regeneration than is necessary for the application and more frequent regeneration than necessary than needed. Undersizing water softeners reduces water use, improves water quality. Softeners should not be sized to remove 100% of hardness for potable water applications. Completely soft water is more corrosive and requires much more salt and regenerations. Softening down to 2 gpg or higher reduces regenerations, salt consumption and salt discharge.
Referenced Standards:	VDI 6023 German Drinking Water Softener

Name:	Markus Lenger
Organization:	CleanBlu Innovations
Representing:	Chairman for WE-Stand Commercial Food Services Task Group
Recommendation:	Revise text
Section Number:	406.3
Proposed Text:	**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~~ comply with NSF 58. **406.3.1 System Efficiency**. Point of use reverse osmosis water treatment systems producing a product water flow rate not exceeding 2.0 gpm (7.6 L/m) shall comply with the system efficiency requirements of ASSE 1086. **406.3.2 Reject Water Reuse**. Reject water shall be permitted for reuse as an alternate water source. Reverse osmosis systems discharging reject water into the hot water distribution system shall comply with IGC 159.
Problem Statement:	Residential occupancies is removed from Section 406.3 because all RO systems (residential and commercial) should be equipped with an automatic shut off valve to prevent water discharge when there is no call for producing water. The RO industry has made the automatic shut off valve part of commercial and residential water treatment design to conserve water. The term listed to when referencing a standard has been removed from the IAPMO Codes and replaced with comply with. Recommend following IAPMO's Manual of Style. The proposed new Section 406.3.1 is added to require system efficiency according to the requirements of ASSE 1086. The ASSE 1086 standard is currently a draft document being developed in the ANSI consensus process to prescribe water efficiency requirements for point of use RO systems that produce a product flow rate of less than 2.0 gpm. This ANSI standard is being created by the industry, labs, and regulators to optimize water efficiency and product performance. The draft document is being provided for the TC review and the published standard will be provided for public comment. The proposed new Section 406.3.2 is added to allow reject water reuse. This allows for the beneficial use of reject water and for markets to develop ways to re-use RO reject water in residential systems. One such development resulted in the development of the IAPMO IGC 159 standard that lists performance requirements and installation requirements for ROs that include water re-use into the hot water distribution system.
Referenced Standards:	ASSE 1086, IGC159

Name:	Markus Lenger
Organization:	CleanBlu Innovations Inc
Representing:	Chairman for WE-Stand Commercial Food Services Task Group
Recommendation:	Add text
Section Number:	407.4.1
Proposed Text:	**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. **407.4.1 Temperature.** Grease interceptors shall be designed and maintained at a temperature not exceeding 95°F (35°C). FOG (fats, oils, and greases) disposal systems in compliance with ASME A112.14.6 using biological cultures or mechanical grease reduction, shall not exceed 104°F (40°C).
Problem Statement:	Over the last few years a new generation of ultra-energy-efficient and water-efficient commercial dishwashers have been introduced into the market and continue to replace older less efficient dishwashers. While such dishwashers use considerably less water, they require more heat to achieve the same cleaning action and to ensure appropriate sterilization. Recent foodborne illnesses have increased and a need for increased sterilization in the form of higher temperatures is thought to be the solution. The FDA (Food and Drug Administration) requires a minimum water temperature of 185°F (85°C) for all commercial food service dishwashers. Such discharge temperatures are not only problematic for the plumbing system, but also severely impede the capability of Grease Interceptors (GI) to function. Such GI's typically require an effluent temperature of 95°F (35°C) or less to effectively separate and sequester the FOG's. At a discharge temperature above 95°F (35°C) the FOG's are still dissolved in the effluent and almost completely bypass these grease control devices. The result is failure to comply with local, state and federal discharge requirements. The proposed solution is intended to inform about this important but often overlooked source of failure and to clarify the maximum temperatures to ensure optimal performance. Systems compliant with ASME A112.14.6 have shown to have efficient FOG separation at higher temperature as GI's alone, as they do have additional separation/disposal mechanism beyond a regular interceptor per Z1001 standard. See supporting article, Furlong, Casey. Sewer Blockages for fats, oil, and grease. WE&T, Dec. 2018.
Referenced Standards:	Sewer Blockages_Furlong

Name:	Markus Lenger
Organization:	CleanBlu Innovations Inc
Representing:	Chairman for WE-Stand Commercial Food Services Task Group
Recommendation:	Add text
Section Number:	407.4.2
Proposed Text:	**407.4.2 Wet Digestors**. Wet digestors shall not connect to a grease interceptor unless the grease interceptor has been designed to receive the discharge from wet digesters. Add Definition: **225.0** **Wet Digestor**. A device intended to manage and dispose of food scraps by using mechanical agitation and aerobic digestion, sometimes aided by the addition of enzymes or microorganisms and potable water, with the process residuals discharged to the sewer.
Problem Statement:	When calculating grease interceptor sizing every fixture has a count because it adds an organic loading source. Grease Interceptors specifically are designed to separate FOG (Fats, Oil and Grease). Wet Digesters are an additional organic load source given its lower pH discharge and it's high TDS (Total Dissolved Solids) that might have a significant impact upon the grease interceptor. Before installing a Wet Digester care should be taken to make sure installed or specified grease interceptor are sized large enough to accommodate the additional organic loading and do not impede the Grease Interceptor performance. There is lack of data to prove there is no impact, there's also lack of data to prove there is a significant impact. But we all can agree that a new organic source of unknown characteristics is introduced into a plumbing system and great confusion exist among regulators and customers about a potential impact to the plumbing system. Manufactures should generate data showing impact to the plumbing system and give sizing guidelines for Interceptors. Low pH alters to separation characteristics in FOG and is well understood and the basis how a DAF (Dissolved Airflow Flotation) works.
Referenced Standards:	

Name:	Markus Lenger
Organization:	CleanBlu Innovations Inc
Representing:	Chairman for WE-Stand Commercial Food Services Task Group
Recommendation:	Revise text
Section Number:	407.5
Proposed Text:	**407.5 Dipper Well Faucets.** Where dipper wells ~~with~~ have a permanent water supply, they shall have metered or sensor activated flow. The volume of water dispensed into a dipper well in each activation cycle of a self-closing fixture fitting shall not exceed the water capacity of the dipper well, and the maximum flow shall not exceed 0.2 gpm (0.8 L/m) at a supply pressure of 60 psi (414 kPa). ~~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 a supply pressure of 60 psi (414 kPa). The water capacity of a dipper well shall be the maximum amount of water that the fixture can hold before water flows into the drain.~~ ~~**407.5.2 Metered or Sensor Activated Flow**. The volume of water dispensed into a dipper well in each activation cycle of a self-closing fixture fitting shall not exceed the water capacity of the dipper well, and the maximum flow shall not exceed 0.2 gpm (0.8 L/m) at a supply pressure of 60 psi (414 kPa).~~
Problem Statement:	The existing provisions were amended by moving sub-section 407.5.2 into Section 407.5. The intent is to prohibit continuous flowing dipper wells. Therefore, provisions in Section 407.5.1 for Maximum Continuous Flow were deleted since no longer applicable. Dipper wells are commonly used in ice cream sales type businesses, sales volumes are seasonal and sporadic, and the dipper well's common design requires a constant running potable water supply, and subsequently waste a lot of potable water. A typical dipper well is supplied by a 3/8 copper water line running at full capacity during the entire time of business operations. The potable water at the dipper well function is solely used for rinsing of spoons. Some health departments do not require dipper wells and agree that rinsing of a spoon occasionally is "OK" or having a spoon for each flavor ice cream sold. Now, there are better dipper well options available that do not require constant water flow, some having refillable containers, other employ metering or sensor faucets.
Referenced Standards:	

WE-Stand 2020 – (407.6.1) Item # 027

Name:	Julius Ballanco
Organization:	JB Engineering and Code Consulting, P.C.
Representing:	InSinkErator
Recommendation:	Revise text
Section Number:	407.6.1
Proposed Text:	**407.6.1 Pulpers and Mechanical Strainers.** The water use for the pulpers or mechanical strainers shall not exceed ~~2~~ 3 gpm. A flow restrictor shall be installed on the water supply to limit the water flow.
Problem Statement:	This modification would increase the allowable flow rate through pulpers and mechanical strainers. When this was originally developed (I served on the subcommittee), the flow rate for pulpers was taken from the available low flow values published by various manufacturers. However, since that time, studying have been done on optimum water use for pulpers. It is a known fact that there are available pulpers that can operate on a flow rate as low as 1 gpm. When the pulper operates at this low a flow, the speed of operation has to also slow down. The result is a much longer cycle of operation. There also is a high care required to avoid line stoppages. When a low flow pulper operates at 3 gpm, there is an optimum performance. The cycle time is shorter resulting in less total water usage when compared to operating at 1 or 2 gpm. The 3 gpm also provides better flow rate in the piping with few stoppages. The requirement should be based on total water usage of the system, not on an incremental flow rate that may result in higher total water usage. A similar proposal is being submitted to the change proposed to the Uniform Plumbing Code.
Referenced Standards:	

WE-Stand 2020 – (407.7) Item # 028

Name:	Markus Lenger
Organization:	CleanBlu Innovations Inc
Representing:	Chairman for WE-Stand Commercial Food Services Task Group
Recommendation:	Add text
Section Number:	407.7
Proposed Text:	**407.7 Tempering Water**. The discharge waste from commercial dishwashers, ware washers, combination ovens, and food steamers that exceeds 140°F (60°C) shall not be tempered with potable water. Where heat recovery can be used beneficially, the discharge waste shall be directed to a heat recovery device. Add Definition **210.0** **Heat Recovery Device**. A heat energy recovery system using equipment known as a heat recovery exchanger, heat exchanger, fluid exchanger, or fluid-to-fluid heat exchanger which employs a cross flow or counter-flow heat exchange between the inbound and outbound liquid flow allowing heat to be transferred from one fluid to the other with the purpose of beneficial use of that recovered heat.
Problem Statement:	Commercial dishwashers commonly have discharge temperatures more than 180°F (82°C). This exceeds most plumbing code limitations of 140°F (60°C) that can discharge into the sanitary system. High-temperature dishwashers can cause damage to the drainage system and allow grease to flow through the grease interceptors without congealing. Common solutions recommended by dishwasher manufacturers is to blend the hot water discharge with potable water. This is not only wasteful of water but increasingly is not allowed in some municipalities that place limits on how much potable water a facility can use. The proposed solution is to use alternate water sources (gray water, rainwater, air conditioning condensate) as an alternative to city potable water to buffer the discharge water temperature to the grease interceptor, or to reclaim the heat discharged to the drain, with a heat exchanger, for beneficial use (such as preheating cold-water makeup to the water heaters).
Referenced Standards:	

WE-Stand 2020 – (407.7) Item # 029

Name:	Markus Lenger
Organization:	CleanBlu Innovations Inc
Representing:	Chairman for WE-Stand Commercial Food Services Task Group
Recommendation:	Add text
Section Number:	407.7
Proposed Text:	**407.7 Water-cooled Frozen Carbonated Beverage Machines**. Condenser water consumption shall be interlocked with refrigeration compressor operation, with the water discharge to be automatically modulated to maintain a minimum 95°F (35°C) discharge water temperature.
Problem Statement:	The intent is to minimize water consumption for water cooled refrigeration systems by interlocking water consumption with compressor operation and to limit condensing water use by controlling the minimum discharge temperature before it can be wasted to drain.
Referenced Standards:	

WE-Stand 2020 – (409.1) Item # 030

<table>
<tr><td>Name:</td><td>Bruce Pfieffer</td></tr>
<tr><td>Organization:</td><td>Self</td></tr>
<tr><td>Representing:</td><td></td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Recommendation:</td><td>Add text</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Section Number:</td><td>409.1</td></tr>
<tr><td>Proposed Text:</td><td>409.0 Leak Detection and Control.
409.1 General. Where installed, leak detection and control devices shall comply with IAPMO IGC 115 or IAPMO IGC 349. Leak detection with control devices shall not be installed where they isolate fire sprinkler systems.

TABLE 901.1
REFERENCED STANDARDS
<table><tr><th>STANDARD NUMBER</th><th>STANDARD TITLE</th><th>APPLICATION</th></tr><tr><td></td><td></td><td></td></tr><tr><td>IAPMO IGC 349-2018</td><td>Electronic Plumbing Supply System Integrity Protection Devices</td><td>Miscellaneous</td></tr><tr><td></td><td></td><td></td></tr></table></td></tr>
<tr><td>Problem Statement:</td><td>IGC 115 covers devices that physically detect leaks through electrodes or other means and send a signal to the control device to turn off the water supply to that area of the plumbing system. IGC 349 covers "Smart Devices" that use a sensitive internal flow detector to measure the flow rate of water through the system. The device either turns off or sends a signal to the user when the flow rate falls outside of a specified usage pattern. Leak detection systems and devices compliant with IGC 115 have been tested and in use for over 10 years. With the development of "Smart" leak detection devices covered by IGC 349 the range of applications for these systems and the number of installations continues to grow. This proposal will expand the code to address the application of these "Smart" leak detection devices and assist the end user in selection of an approved device for installation and ensure the health and safety of the public through code enforcement.</td></tr>
<tr><td>Referenced Standards:</td><td>IGC 349-2018, Electronic Plumbing Supply System Integrity Protection Devices</td></tr>
</table>

WE-Stand 2020 – (415.1) Item # 031

Name:	Thomas Pape
Organization:	BMP
Representing:	Chairman for WE-Stand Water Efficiency Task Group
Recommendation:	Revise text
Section Number:	415.1
Proposed Text:	**415.1 General**. Where landscape irrigation systems are installed, they shall comply with Sections 415.2 through 415.15. Requirements limiting the amount or type of plant material used in landscapes shall be established by the Authority Having Jurisdiction. ~~**Exception**: Plants grown for food production~~.
Problem Statement:	Remove exception and make it applicable only in sections where needed instead of general provisions.
Referenced Standards:	

Name:	Thomas Pape
Organization:	BMP
Representing:	Chairman for WE-Stand Water Efficiency Task Group
Recommendation:	Add text
Section Number:	415.1, 415.2
Proposed Text:	**415.1 General**. Where landscape irrigation systems are installed, They shall comply with Sections 415.2 through ~~415.15~~ 415.16. ~~Requirements limiting the amount of plant material used in landscapes shall be established by the Authority Having Jurisdiction.~~ ~~**Exception**: Plants grown for food production~~. **415.2 Plant and Irrigation System Limitations.** Nuisance, invasive and noxious plants as defined by the Authority Having Jurisdiction shall not be used in the landscape. Plants not requiring supplement irrigation and not principally used as an athletic field or public recreation shall be used in no less than 60 percent of the landscape that is not principally used as an athletic field or public recreation. In-ground irrigation system shall not be installed in more than than 40 percent of the landscaped area. **Exceptions:** a. Where average annual rainfall is less than 12 inches and in landscape areas where the plant materials have an annual ETc of not exceeding 15 inches, an in-ground irrigation system shall be allowed; b. Where neither potable or reclaimed (recycled) water is used in the irrigation system, an in-ground irrigation system shall be allowed in 100 percent of the landscaped area and vegetative roofs. (Renumber remaining sections)
Problem Statement:	Plant selection can have a large impact in irrigation water needs. This provision establishes that most of the landscape plant selection must be compatible with the natural rainfall. The exception (a) is to allow desert communities with less than 12 inches annual rainfall to have a complete vegetative landscape. The reason for the difference between ETc and rainfall is that plant ETc is based on maximum biomass, not minimum water needs to thrive. Exception (b) encourages alternate water collection and use.
Referenced Standards:	

WE-Stand 2020 – (207.0) Item # 003

Name:	Thomas Pape
Organization:	BMP
Representing:	Chairman for WE-Stand Water Efficiency Task Group
Recommendation:	Add text
Section Number:	207.0
Proposed Text:	**ETc.** Evapotranspiration rate of the plants derived by multiplying ETo by the appropriate plant factor or coefficient. ***ETo.*** Reference *evapotranspiration* for a cool-season grass as calculated by the standardized Penman-Monteith equation based on weather-station data.
Problem Statement:	These terms are used in new proposed text in Chapter 4.
Referenced Standards:	

WE-Stand 2020 – (415.2.1) Item # 033

Name:	Thomas Pape
Organization:	BMP
Representing:	Chairman for WE-Stand Water Efficiency Task Group
Recommendation:	Add text
Section Number:	415.2.1
Proposed Text:	**415.2.1 Vegetative Roofs and Walls.** Irrigation systems using reclaimed (recycled) or potable water for vegetative roofs and walls are prohibited. (Renumber remaining sections)
Problem Statement:	Many vegetative roofs and walls are not water efficient. Currently there is not an ANSI standard for designing and building these systems with adequate water efficiency provisions. Reclaimed water is now being used to recharge ground water basins and converted to potable water; thus needs to be protected from waste.
Referenced Standards:	

Name:	Thomas Pape
Organization:	BMP
Representing:	Chairman for WE-Stand Water Efficiency Task Group
Recommendation:	Revise text
Section Number:	415.4
Proposed Text:	**415.4 Use of Alternate Water Sources for Landscape Irrigation**. Where available by pre-existing treatment, storage or distribution network, and where approved by the Authority Having Jurisdiction, alternative water source(s) complying with Chapter 5 shall be utilized for landscape irrigation. Where adequate capacity and volumes of pre-existing alternative water sources are available, the irrigation system shall be designed to use minimum of 75 percent of alternative water for the annual irrigation demand before supplemental potable water is used. **Exception**: Plants grown for food production for direct human consumption.
Problem Statement:	Substantiation: The food supply requires greater caution for human health and safety.
Referenced Standards:	

Name:	Thomas Pape
Organization:	BMP
Representing:	Chairman for WE-Stand Water Efficiency Task Group
Recommendation:	Revise text
Section Number:	415.5
Proposed Text:	**415.5 Irrigation Control Systems**. Where installed as part of a landscape irrigation system, irrigation control systems shall: (1) remains the same. (2) Utilize ~~on-site~~ sensors to inhibit or suspend irrigation ~~when adequate soil moisture is present or~~ during rainfall or freezing conditions. (3) remains the same. (4) Have the capability to program multiple and different run times for each irrigation zone to enable cycling of water applications and durations to mitigate <u>surface</u> water flowing off of the intended irrigation zone. (5) through (7) remains the same.
Problem Statement:	Smart sensors are not necessarily on site. Also removing redundancy with provision (3). Need to clarify that the intent is to mitigate SURFACE water.
Referenced Standards:	

Name:	Kelsey Jacquard
Organization:	Hunter Industries
Recommendation:	Add text
Section Number:	415.5(2)
Proposed Text:	**415.5 Irrigation Control Systems**. Where installed as part of a landscape irrigation system, irrigation control systems shall: (1) remains the same. (2) Utilize on-site sensors or remote weather data to inhibit or suspend irrigation when adequate soil moisture is present or during rainfall or freezing conditions. (3) through (7) remains the same.
Problem Statement:	It is recommended to clarify or remove the requirement for on-site sensor controls. With Wifi based systems, remote and satellite data can be used to inhibit, suspend, and modify irrigation schedules. These Wifi based systems are EPA WaterSense approved as standalone controllers which are referenced in the third bullet item as well as referenced in Section 415.11.6.
Referenced Standards:	

Name:	Kelsey Jacquard
Organization:	Hunter Industries
Recommendation:	Delete text
Section Number:	415.9(3)
Proposed Text:	**415.9 System Performance Requirements.** The landscape irrigation system shall be designed and installed to: (1) through (2) remains the same. (3) Not allow irrigation water to be applied onto or enter non-targeted non-permeable areas including: adjacent property ~~and vegetation areas, adjacent hydrozones not requiring the irrigation water to meet its irrigation demand~~, non-vegetative areas, impermeable surfaces, roadways, and structures.
Problem Statement:	It is recommended to match the established CA standard MWELO of allowing overspray onto adjacent permeable or landscaped areas. CA MWELO allows for less sprinkler setbacks if the landscaped area is adjacent to permeable surfacing and no runoff occurs or the adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping (MWELO Section 492.7.U).
Referenced Standards:	CA MWELO Section 492.7.U

Name:	Thomas Pape
Organization:	BMP
Representing:	Chairman for WE-Stand Water Efficiency Task Group
Recommendation:	Revise text
Section Number:	415.11(6)
Proposed Text:	**415.11 Irrigation System Inspection and Performance Check**. The irrigation system shall be inspected to verify compliance with the irrigation design in accordance with the following: (1) through (5) remains the same. (6) Control system shall be installed as specified and listed as ~~include~~ a US EPA WaterSense ~~labeled~~ controller, and all sensors shall be ~~installed and~~ verified for proper installation and operation. (7) through (9) remains the same.
Problem Statement:	To be consistent with language elsewhere in WE-Stand as well as in the UPC.
Referenced Standards:	

WE-Stand 2020 – (415.11(7)) Item # 039

Name:	Kelsey Jacquard
Organization:	Hunter Industries
Recommendation:	Add text
Section Number:	415.11(7)
Proposed Text:	**415.11 Irrigation System Inspection and Performance Check**. The irrigation system shall be inspected to verify compliance with the irrigation design in accordance with the following: (1) through (6) remains the same. (7) The peak demand irrigation schedule shall be posted near the controller or accessible through a mobile device, or the scheduling parameters for the controller shall be listed for each station including cycle and soak times. (8) through (9) remains the same.
Problem Statement:	Recommend adding language of "or accessible through a mobile device." If scheduling is controlled through a phone or tablet, the schedule may not be posted near the controller while still remaining accessible to those in charge of the controller.
Referenced Standards:	

Name:	Kelsey Jacquard
Organization:	Hunter Industries
Recommendation:	Revise text
Section Number:	415.12.1
Proposed Text:	**415.12.1 Sprinkler Heads in Common Irrigation Zones.** Sprinkler heads installed in irrigation zones served by a common valve shall be limited to applying water to plants with similar irrigation needs, and shall have matched precipitation rates (identical inches of water application per hour plus or minus ~~7 percent~~ 20 percent as labeled or declared in manufacturer's published performance data).
Problem Statement:	A tolerance of plus or minus 7% is tight. A product with an application rate of .4 in/hr would be allowed a range of 0.372 - 0.428 in/hr, which may be difficult to target and measure.
Referenced Standards:	

WE-Stand 2020 – (415.12.4) Item # 041

Name:	Thomas Pape
Organization:	BMP
Representing:	Chairman for WE-Stand Water Efficiency Task Group
Recommendation:	Add text
Section Number:	415.12.4
Proposed Text:	**415.12.4 Sprinkler Head Maximum Precipitation Rate.** Where the slope of the landscape exceeds 25 percent, the precipitation rate of sprinkler heads shall not exceed 1.75 inches per hour when tested to ASABE/ICC 802.
Problem Statement:	Need to limit precipitation rates where run-off is likely to occur. Typical soil absorption is 1/3 inch per hour.
Referenced Standards:	

Name:	Tom Pape
Organization:	BMP
Representing:	Chairman for WE-Stand Water Efficiency Task Group
Recommendation:	Revise text
Section Number:	418.3
Proposed Text:	**418.3 Covers.** ~~Heated~~ Pools and in-ground permanently installed spas~~, and portable spas~~ shall be provided with a non-liquid vapor retardant cover. The cover shall not prevent collection of rain water into outdoor pools. ~~**Exception:** Where more than 70 percent of the energy for heating, computed over an operating season, is from site recovered energy such as from a heat pump or solar energy source.~~
Problem Statement:	Rainwater entering the pool provides several benefits. Liquid type barriers do not provide as much evaporation prevention as physical barriers. The exception does not address water efficiency measures and is recommended to be removed.
Referenced Standards:	

Name:	Thomas Pape
Organization:	BMP
Representing:	Chairman for WE-Stand Water Efficiency Task Group
Recommendation:	Add text
Section Number:	418.6
Proposed Text:	**418.6 Backwash Reuse**. Backwash from pool filters shall be used as an alternate water source and shall be treated for its intended purpose in accordance with Section 504.0 for on-site treated nonpotable water systems. **418.6.1 Backwash Control**. A control system shall be provided to maximize backwash water efficiency. Controllers on fixed-time intervals shall be prohibited.
Problem Statement:	Backwashing pool filters can waste significant water, which should be reused where possible. The frequency of backwashing should be based on the how contaminated the filter has become, not specified time intervals. There are multiple sensor options that are more efficient than timers.
Referenced Standards:	

Name:	Bruce Pfieffer
Organization:	Self
Recommendation:	Add text
Section Number:	501.7
Proposed Text:	**501.7 Minimum Water Quality Requirements.** The minimum water quality for alternate water source systems shall meet the applicable water quality requirements for the intended application as determined by the Authority Having Jurisdiction. In the absence of water quality requirements for on-site treated nonpotable systems, the water quality requirements of IAPMO IGC 324, NSF 350 or the EPA/625/R-04/108 shall apply. **Exception:** Water treatment is not required for gray water used for subsurface irrigation.
Problem Statement:	The water quality requirements in IGC 324 and NSF 350 are compared (Comparison Table Provided in Supporting Material). The allowance of Total Suspended Solids (TSS) and Turbidity are less stringent in NSF 350 then in IGC 324. IGC 324 requires measurements for Total Coliforms and Fecal Coliforms. NSF 350 measures E. Coli, one type of Fecal Coliform. In addition, IGC 324 limits the allowance of Helminth Eggs, Viruses, Nitrogen, Phosphorous and Heavy metals like Mercury, which NSF 350 does not measure.
Referenced Standards:	IAPMO IGC 324-2016e1, Alternate Water Source Systems for Single-Family Dwellings

TABLE 901.1
REFERENCED STANDARDS

STANDARD NUMBER	STANDARD TITLE	APPLICATION
IAPMO IGC 324-2016e1	Alternate Water Source Systems for Single Family Dwellings	Miscellaneous

Name:	Christina E. Bertea
Organization:	Greywater Action
Recommendation:	Add text
Section Number:	502.2
Proposed Text:	**502.2 Gray Water Collection Piping.** New single-family dwellings shall have ~~the~~ a separate waste piping system for all gray water fixtures per the Plumbing Code. The separate piping system shall be piped to outside the building and terminate into an approved Gray Water Diverter Valve per Section 502.5 before connecting to the waste system from non-gray water fixtures. Where the Gray Water Diverter Valve is positioned at a higher elevation than outside, the separate waste piping for all gray water fixtures shall be allowed to be piped to a basement or crawlspace under the building where it terminates into an approved Gray Water Diverter Valve per Section 502.5 before connecting to the waste system from non-gray water fixtures.
Problem Statement:	Positioning the Gray Water Diverter Valve at as high an elevation as possible provides more choices about the type of Gray Water Irrigation System to be installed eventually. If the Valve is positioned in the ground outside the building the choices for eventual systems may be limited and are likely to require a pump. While 502.2 in its original form does not say that the Diverter Valve must be underground outside, that may be the typical interpretation. Adding language allowing for other Valve locations gives more flexibility and access to more types of Gray Water Systems. Gravity fed Gray Water Systems are particularly robust, efficient, and easy to maintain. It is always advantageous to have the starting point of the System at the Gray Water Diverter Valve be as high in the overall landscape as possible.
Referenced Standards:	

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	502.12.1 Single Family Dwellings and Multi-Family Dwellings.
Proposed Text:	**502.12.1 Single Family Dwellings and Multi-Family Dwellings.** The gray water discharge for single family and multi-family dwellings shall be calculated by water use records, calculations of local daily per person interior water use, or the following procedure: (1) remains the same. (2) The estimated gray water flows of each occupant shall be calculated as follows: Showers~~,~~ and bathtubs ~~and lavatories 25~~ 13 gallons ~~(95~~ 50 L) per day/occupant Lavatories 11 gallons (42 L) per day/occupant Laundry ~~15~~ 10 gallons ~~(57~~ 38 L) per day/occupant (3) remains the same.
Problem Statement:	The previous numbers of 25 gpcd for showers/baths/lav and 15 gpcd for washers are outdated and reflective of flow rates from the 1999 Residential End Use of Water Study (REUS). These estimates should be updated to reflect the new REUS study released in 2016. The study found that per capita indoor use has gone down overall. New numbers are: Clothes Washer- 9.6 gpcd Shower: 11.1 gpcd Bath 1.5 gpcd Faucets 11.1 gcd (this includes all sinks, which is not representative of graywater sink flow rates limited to the bathroom, but the study didn't provide any other numbers for sinks) View the study here http://www.waterrf.org/PublicReportLibrary/4309A.pdf Lavatory sinks should be separated from showers/bathtubs because many systems don't include the sink and there is currently no way to reduce the sizing to accommodate this. Also, if someone wanted to permit just a lavatory sink they should have an estimate that does not include showers/baths. Even though the number from the REUS for sinks combines lavatory and kitchen sinks there is no reputable study showing just lavatory sinks. It would be better to use this overly high estimate than have nothing at all for lavatory sinks.
Referenced Standards:	Residential End Uses of Water Executive Report

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Delete text
Section Number:	502.13.2
Proposed Text:	**502.13.2 Gray Water Pipe and Fitting Materials.** Aboveground and underground building drainage and vent pipe and fittings for gray water systems shall comply with the requirements for aboveground and underground sanitary building drainage and vent pipe and fittings in the plumbing code. ~~These materials shall extend not less than 2 feet (610 mm) outside the building.~~
Problem Statement:	Some graywater systems route graywater into a tank under the building or in the basement. The tank pumps graywater directly to the landscape, so there would not be drainage piping used for this type of system outside the building. In addition, the requirement of using drainage piping outside the building is not connected to health or safety, it's merely a design consideration.
Referenced Standards:	

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Delete text
Section Number:	502.13.7
Proposed Text:	~~**502.13.7 Backwater Valve.** A backwater valve shall be installed on all gray water drain connections to the sanitary drain or sewer.~~
Problem Statement:	There are two, nearly identical, sections on backwater valves in the graywater section. This one I propose to remove, it is in the "graywater system components" section. The other section on backwater valves is in the general requirements on graywater. "502.6 Backwater Valves. Gray water drains subject to backflow shall be provided with a backwater valve so located as to be accessible for inspection and maintenance." Since a backwater valve isn't really a graywater system component it fits better under the general requirements where it is also located. I propose removing it here and leaving it in 502.6.
Referenced Standards:	

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	Table 502.14.1

Proposed Text:

~~TYPE OF SOIL~~	~~MINIMUM SQUARE FEET OF IRRIGATION AREA PER 100 GALLONS OF ESTIMATED GRAY WATER DISCHARGE PER DAY~~	~~MAXIMUM ABSORPTION CAPACITY IN GALLONS PER SQUARE FOOT OF IRRIGATION/LEACHING AREA FOR A 24-HOUR PERIOD~~
~~Coarse sand or gravel~~	~~20~~	~~5.0~~
~~Fine sand~~	~~25~~	~~4.0~~
~~Sandy loam~~	~~40~~	~~2.5~~
~~Sandy clay~~	~~60~~	~~1.7~~
~~Clay with considerable sand or gravel~~	~~90~~	~~1.1~~
~~Clay with small amounts of sand or gravel~~	~~120~~	~~0.8~~

Proposed new table 502.14.1

Soil Class and Textures	**Maximum absorption capacity in gallons per square foot of irrigation/leaching area for a 24 hour period.**
Sandy Loam (Group A) (Textures: sand, loamy sand, sandy loam)	**11.9**
Loam (Group B) (Textures: loam, silt loam)	**4.5**
Sandy Clay Loam (Group C) (Textures: Sandy clay loam)	**3.0**
Clay Loam (Group D) (Textures: clay loam, silty clay loam, sandy clay, silty clay, clay	**0.9**

Problem Statement:	This is a joint submittal from Laura Allen (Greywater Action), Leigh Jerrard (principal of Greywater Corps, licensed architect and general contractor) and Sherry LeeBryan (Program Manager of Ecology Action). The existing Table 502.14.1 "Design of Six Typical Soils" does not appear to come from a referenced source and the names of the soils are not typical soils. If someone were to send their soil into a laboratory for testing, or perform an on-site test using standard soil texture identification methods (jar test or soil ribbon test) the soil names they would get would most likely not match this chart. We have not been able to find the original source for the information in this table. The information doesn't appear to come from septic design or irrigation system design: it appears the original creators of this table used some unknown infiltration rate and applied an unknown factor to come up with the provided coefficients for infiltration graywater into various types of soil. This new proposed table uses steady state infiltration rates from the Minnesota Stormwater Manual 2013. This manual compiled infiltration rates and recommendations based on a review of 30 guidance manuals and other stormwater references. Other agencies, like the San Francisco Public Utilities Commission, use the same table in their stormwater system sizing manuals. The table uses steady state infiltration rates and is based on the assumption that the soil is very deeply wetted below (or at field capacity), which builds in a safety factor into the numbers. (Graywater systems are typically shut off during the rainy season so the soil would not be at field capacity during irrigation time.) By adopting this new table WE-Stand would be using a soil infiltration table that is aligned with actual, published references that are used by stormwater, civil engineers, and landscape professionals. The proposed table includes both hydrologic groups, which a person could look up the property's hydrologic group on a GIS map or NRCS map, as well as soil textures which an on-site soil test could verify. The proposed table is more conservative for clay soil types, and so would have less potential for overloading slower draining soils than the existing table. The proposed table has higher infiltration rates for sandy and loam soils, which are soils that are verified by studies (see references for Stormwater Manual) to infiltrate much much more water than the current table permits. To create the new table we converted the units provided in the referenced table from inches/hour to gallons/day as shown in the reference material. This is the source for the steady state infiltration rates: Minnesota Stormwater Manual 2013 -thirty guidance manuals and many other stormwater references were reviewed to compile recommended infiltration rates. All of these sources use the following studies as the basis for their recommended infiltration rates: (1) Rawls, Brakensiek and Saxton (1982); (2) Rawls, Gimenez and Grossman (1998); (3) Bouwer and Rice (1984); and (4) Urban Hydrology for Small Watersheds (NRCS). SWWD, 2005, provides field documented data that supports the proposed infiltration rates. (view reference list here https://stormwater.pca.state.mn.us/index.php?title=References) The Full Minnesota Stormwater Manual is available on-line here: https://stormwater.pca.state.mn.us/index.php?title=Main_Page
Referenced Standards:	Minnesota Stormwater Manual

<table>
<tr><td>Name:</td><td>Bruce Pfieffer</td></tr>
<tr><td>Organization:</td><td>Self</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Recommendation:</td><td>Add text</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Section Number:</td><td>504.7</td></tr>
<tr><td>Proposed Text:</td><td>504.7 On-Site Treated Nonpotable Water Devices and Systems. Devices or equipment used to treat on-site treated nonpotable water in order to maintain the minimum water quality requirements determined by the Authority Having Jurisdiction shall be listed or labeled (third-party certified) by a listing agency (accredited conformity assessment body) or approved for the intended application. Devices or equipment used to treat on-site treated nonpotable water for use in water closet and urinal flushing, surface irrigation and similar applications shall be listed or labeled to IAPMO IGC 207, IAPMO IGC 324, NSF 350 or approved by the Authority Having Jurisdiction.

TABLE 901.1
REFERENCED STANDARDS
<table><tr><th>STANDARD NUMBER</th><th>STANDARD TITLE</th><th>APPLICATION</th></tr><tr><td></td><td></td><td></td></tr><tr><td>IAPMO IGC 324-2016e1</td><td>Alternate Water Source Systems for Single Family Dwellings</td><td>Miscellaneous</td></tr></table></td></tr>
<tr><td>Problem Statement:</td><td>Systems compliant with IGC 324 are limited to use in single family dwellings. This addition will improve the health and safety of the public by providing an additional option for alternate water source systems, where the alternative may be a do-it-yourself gray water pond or tank installed without a permit or the help of a professional plumber. The water quality requirements in IGC 324 and NSF 350 are compared (Comparison Table Provided in Supporting Material). The allowance of Total Suspended Solids (TSS) and Turbidity are less stringent in NSF 350 then in IGC 324. IGC 324 requires measurements for Total Coliforms and Fecal Coliforms. NSF 350 measures E. Coli, one type of Fecal Coliform. In addition, IGC 324 limits the allowance of Helminth Eggs, Viruses, Nitrogen, Phosphorous and Heavy metals like Mercury, which NSF 350 does not measure.</td></tr>
<tr><td>Referenced Standards:</td><td>IAPMO IGC 324-2016e1, Alternate Water Source Systems for Single-Family Dwellings</td></tr>
</table>

Name:	Jim Kendzel
Organization:	American Supply Association
Representing:	Chairman for WE-Stand Alternate Water Sources Task Group
Recommendation:	Add text
Section Number:	505.0

Proposed Text:

505.0 Onsite Blackwater Treatment Systems.

505.1 General. The provisions of this section shall apply to the water quality, monitoring, design, construction, alteration, repair, and operation requirements of onsite blackwater treatment systems for non-potable reuse.

505.2 Allowable Use of Blackwater. Where approved or required by the Authority Having Jurisdiction, blackwater shall be permitted to be used in lieu of potable water for uses such as, but not limited, to water closets, urinals, clothes washers, ornamental plant irrigation, and dust suppression.

505.3 System Design. Onsite blackwater treatment systems shall be designed in accordance with this section by a licensed plumbing contractor, Registered Design Professional, or a person who demonstrates competency to design blackwater treatment systems as required by the Authority Having Jurisdiction. Components, piping, and fittings used in any blackwater system shall be listed.

505.4 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any blackwater treatment system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.

505.5 Component Identification. System components shall be properly identified as to the manufacturer.

505.6 Material Compatibility. Blackwater treatment systems shall be constructed of materials that are compatible with the type of pipe and fitting materials, water treatment, and water conditions in the system.

505.7 Log Reduction Targets. Blackwater treatment systems shall be designed to meet the log reduction targets as set forth in Table 505.7. To meet the log reduction targets in Table 505.7, treatment processes used in blackwater systems shall comply with 505.8 for validation or be operated according to conditions approved by the Authority Having Jurisdiction.

Table 505.7
LOG REDUCTION TARGETS FOR 10^{-4} INFECTIONS PER PERSON PER YEAR BENCHMARKS FOR BLACKWATER TREATMENT SYSTEMS

Water Use Scenario	Enteric Viruses	Parasitic Protozoa	Enteric Bacteria
Ornamental plant irrigation[1]/dust suppression	8.0	7.0	6.0
Indoor Use	8.5	7.0	6.0

[1] Non-food

505.8 Validation. Where applicable, treatment processes shall be tested to verify their pathogen reduction performance. This can be accomplished through a validation test or by using a challenge test during field verification. The results of the validation test or challenge test shall be summarized in a validation report prepared by a Registered Design Professional. The validation report shall document the treatment technology's log reduction performance, including information on the operating conditions and surrogate parameters.

505.9 Health and Safety. Treated blackwater shall not create a nuisance or odor, nor threaten human health, or damage the quality of surface water or groundwater.

505.10 Monitoring Requirements. Treatment processes that are used to meet a log reduction target shall have continuous monitoring using surrogate parameters to verify the pathogen reduction performance. Instrumentation with continuous monitoring capabilities shall be routinely calibrated.

505.11 Design and Installation. The design and installation of onsite blackwater treatment systems shall meet the requirements of Section 505.11.1 through Section 505.11.6.

505.11.1 Connections to Potable or Reclaimed (Recycled) Water Systems. Blackwater treatment systems shall have no direct connection to any potable water supply or reclaimed (recycled) water source system. Potable water or reclaimed (recycled) water shall be permitted to be used as makeup water for a blackwater treatment system provided the potable or reclaimed (recycled) water supply connection is protected by an airgap.

505.11.2 Bypass Connection. A bypass shall be provided for the input connection to the blackwater treatment system. The bypass shall be a diverter valve normally open to the blackwater treatment system. The normally closed port of the diverter valve shall be connected directly to the plumbing drainage system according to the plumbing code.

505.11.3 Overflow Connection. Blackwater treatment overflow shall be connected directly to the plumbing drainage system. The overflow shall be provided with a backwater valve at the point of connection to the plumbing drainage system. The backwater valve shall be accessible for inspection and maintenance.

505.11.4 Fail-safe Mechanisms. Blackwater treatment systems shall be equipped with an automatic shutdown of the treatment process when a malfunction occurs.

505.11.5 Flow Meter. Buildings with blackwater treatment systems shall include a flow meter on the treated blackwater distribution system and a flow meter on the potable make-up water connection to the blackwater treatment system.

505.11.6 Cross-Connection Inspection and Testing. A cross-connection test is required in accordance with Section 501.11. Before the building is occupied or the system is activated, the installer shall perform the initial cross-connection test in the presence of the Authority Having Jurisdiction. The test shall be ruled successful by the Authority Having Jurisdiction before final approval is granted.

505.12 Commissioning. Onsite blackwater treatment systems shall meet the commissioning requirements of Section 505.12.1 through Section 505.12.6.

505.12.1 Commissioning Requirements. Commissioning for blackwater treatment systems shall be included in the design and construction processes of the project. Commissioning shall be performed by a person who demonstrates competency in commissioning blackwater treatment systems as required by the Authority Having Jurisdiction.

505.12.2 Commissioning Plan. A commissioning plan shall be included in the construction documents and shall be completed to document the approach to how the blackwater treatment system will be commissioned and shall be started during the design phase of the project. The commissioning plan shall be approved by the Authority Having Jurisdiction prior to commissioning the blackwater treatment system. The commissioning plan shall include the following:

1) General project information.
2) Commissioning goals.
3) Equipment to be tested, including the extent of tests.
4) Functions to be tested.
5) Conditions under which the test shall be performed.
6) Measurable criteria for acceptable performance.
7) Commissioning team contact information.
8) Commissioning process activities, schedules, and responsibilities. Plans for the completion of functional performance testing, post construction documentation and training, and the commissioning report shall be included.

505.12.3 Functional Performance Testing. Functional performance tests shall demonstrate the correct installation and operation of the equipment of the blackwater treatment system in accordance with the approved plans and specifications. Functional performance testing reports shall be prepared and contain information addressing the equipment tested, the testing methods utilized, and proof of proper calibration of the equipment. The units of measure used in functional performance testing shall be the type of unit measurement acceptable to the Authority Having Jurisdiction.

505.12.4 Systems Operations Training. The training of the appropriate maintenance staff for each component of the blackwater treatment system shall include not less than the following:

1) Blackwater treatment system and equipment overview, including what each component is, what its function is, and what other systems or equipment it interfaces with.
2) Review of the information in the operations and maintenance manual.
3) Review of the record drawings on the system/equipment.

505.12.5 Commissioning Report. A complete report of commissioning process activities undertaken through the design, construction, and post-construction phases of the blackwater treatment system shall be completed, provided to the owner of the blackwater treatment system, and submitted to the Authority Having Jurisdiction upon completion of the commissioning of the blackwater treatment system.

505.12.6 Certificate of Completion. The Authority Having Jurisdiction shall not issue the final certificate of completion until the commissioning report has been submitted and approved. Copies of the commissioning report are required to be posted, or made available with the permit(s), and shall be made available to the Authority Having Jurisdiction at any time upon request.

505.13 Operation and Maintenance Manual. An operation and maintenance manual shall be provided in accordance with Section 501.6 and shall also include the following:

1) Instructions on operating and maintaining the system, including treatment process operations, instrumentation and alarms, and chemicals storage and handling.
2) Site equipment inventory and maintenance notes.
3) Equipment/system warranty documentation and information.
4) As-Built" design drawings.
5) Details on training requirements and qualifications of personnel responsible for operating the system.
6) Maintenance schedule.

505.14 Inspection. Field inspections shall take place during and after construction while the contractor is on-site to verify that the blackwater treatment system components have been properly supplied and installed according to the plans and specifications used for installation. Record drawings shall be maintained with changes to the approved plans by the contractor and available for periodic inspection as needed.

Add the following Definitions:

203.0

Air Gap, Drainage. The unobstructed vertical distance through the free atmosphere between the lowest opening from a pipe, plumbing fixture, appliance, or appurtenance conveying waste to the flood-level rim of the receptor.

Air Gap, Water Distribution. The unobstructed vertical distance through the free atmosphere between the lowest opening from a pipe or faucet conveying potable water to the flood-level rim of a tank, vat, or fixture.

204.0

Blackwater. Waste water containing bodily or other biological wastes discharged from toilets and kitchen sink waste.

205.0

Challenge Test. The evaluation of a unit treatment process for pathogen $\log_{10}$ reduction performance using selected surrogate or indigenous constituents.

	Continuous Monitoring. Ongoing confirmation of system performance using sensors for continuous observation of selected parameters, including surrogate parameters that are correlated with pathogen log reduction target requirements. **Cross-connection.** A connection or arrangement, physical or otherwise, between a potable water supply system and a plumbing fixture or a tank, receptor, equipment, or device, through which it may be possible for non-potable, used, unclean, polluted, and contaminated water, or other substances to enter into a part of such potable water system under any condition. **208.0** **Field Verification.** Performance confirmation study conducted using challenge testing, including surrogate microorganisms and/or other non-biological surrogates, usually during startup and commissioning and may be repeated as needed. The need for, duration, and extent of the field verification procedure will depend on characteristics of the blackwater treatment system. **214.0** **Log_{10} Reduction.** The removal of a pathogen or surrogate in a unit process expressed in log_{10} units. A 1-log reduction equates to 90% removal, 2-log reduction to 99% removal, 3-log reduction to 99.9% removal, and so on. **Log_{10} Reduction Target (LRT).** The log_{10} reduction target for the specified pathogen group (e.g., viruses, bacteria, or protozoa) to achieve the identified level of risk to individuals (e.g., 10^{-4} infection per year). **221.0** **Surrogate**. A biological, chemical, or physical parameter used to verify pathogen reductions performances. **224.0** **Validation Test.** Detailed technology evaluation study that was conducted to challenge the treatment technology over a wide range of operational conditions. **Validation Report.** Report documenting the results of a validation test or challenge test conducted during field verification.
Problem Statement:	The Alternate Water Task Group (AWTG) proposes comprehensive requirements related to the water quality, monitoring, design, construction, commissioning, alteration, repair, and operation requirements of blackwater and stormwater systems for non-potable water reuse. These requirements for a properly designed system, together with appropriate construction, operation, and maintenance, will help ensure blackwater and stormwater systems will be implemented safely and reliably. The AWTG considered two treatment threshold approaches for blackwater. The first approach is published in ISO 30500 Non-Sewered Sanitation Systems and the other is published in Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems. The AWTG chose the latter as what is believed to be the more stringent approach. The AWTG proposes to incorporate health risk-based water quality requirements for blackwater and stormwater systems. The risk-based water quality approach was developed through recent research by the National Water Research Institute (NWRI) and the Water Research Foundation (WRF), culminating in the report Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems. Utilizing similar methodology as is employed in potable reuse and drinking water regulations, the risk-based LRTs align with the Water Safety Plan approach promoted by the World Health Organization. Blackwater and stormwater may contain pathogenic microorganisms that, if not properly treated, can cause infection due to exposure to these waters when recycled and used onsite. The intent of the risk-based framework is to determine the appropriate level of treatment for pathogens that is needed to protect public health, accounting for such factors as the source water quality, specific end use, and acceptable risk of infection from exposure to the treated water. The risk threshold used for this application is the same as has been previously applied in the context of municipal drinking water, i.e. exposure to this water via toilet flushing, irrigation, and other non-potable uses poses no greater risk than drinking municipally supplied drinking water. Because the amount of pathogen reduction for reuse usually spans orders of magnitude, pathogen treatment requirements are specified in terms of log10 reduction; 1-log10 reduction equates to 90% removal, 2-log10 reduction to 99%

	removal, 3-log10 reduction to 99.9% removal, and so on. The treatment requirements developed using the risk-based methodology in this case are called log reduction targets, or LRTs. The LRTs were developed using a Quantitative Microbial Risk Assessment (QMRA). QMRA is a scientific approach to estimating the potential human health risks associated with exposure to microbial hazards (in this case, human pathogenic viruses, bacteria, and protozoa). LRTs for blackwater and stormwater reuse for unrestricted irrigation and toilet flushing were developed based on the annual risk level of 10-4 infections per person per year. Unit treatment processes that are effective at removing and/or inactivating pathogens can be used to meet the LRTs. In most cases, several unit processes are needed in series to provide sufficient treatment. The ability of unit processes to provide a certain level of treatment is verified through the use of ongoing monitoring and, in some cases, validation. For some unit processes, validation is critical to determine how the process can be used to achieve the LRTs. The AWTG also proposes to incorporate a monitoring approach for blackwater and stormwater systems that aligns with the research. The framework for monitoring deviates from traditional approaches of monitoring fecal indicator organisms (FIOs) in grab samples because there are recognized limitations of using FIOs. The primary limitation of FIO monitoring is that it cannot be done continuously to ensure safe water is delivered to the end use at all times. Rather, the AWTG is proposing continuous water quality monitoring of surrogate parameters such as turbidity, residual chlorine, ultraviolet transmittance, and others to verify that treatment processes are operating as designed. Discussion: The AWTG supports the use of a health risk-based approach to guide treatment and design requirements for blackwater and stormwater systems because it ensures that systems implemented using this framework are safe and reliable. The requirements being proposed are intended to ensure that public health is protected while still allowing for flexibility in design, as it does not prescribe that specific treatment processes must be used. It is timely that AWTG is proposing these requirements because several states have recently moved forward to adopt the risk-based framework at the state level. Much of this work has been driven by the work of the National Blue Ribbon Commission for Onsite Non-potable Water Systems, a coalition of public health agencies and water and wastewater utilities committed to advancing the safe, practical, and sustainable implementation of alternate water source systems. As a result of the Commission's work, several states including California, Colorado, Minnesota, Oregon, Washington, and Hawaii are proposing legislation to adopt the risk-based approach. Therefore, institutionalizing the risk-based approach in WE•Stand will create further consistency across the country by aligning plumbing and health code requirements for alternate water source systems. Resources: The AWTG used the following resources to develop the proposed text for both stormwater and blackwater treatment systems. These resources provided the AWTG with a technically sound template for the development of requirements for blackwater and stormwater treatment systems that fit well into the both the scope and format structure of model codes used by WE•Stand. 1. Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems https://www.werf.org/a/ka/Search/ResearchProfile.aspx?ReportId=SIWM10C15 2. A Guidebook for Developing and Implementing Regulations for Onsite Non-potable Water Systems developed by the National Blue Ribbon Commission for Onsite Non-Potable Water Systems https://sfwater.org/Modules/ShowDocument.aspx?documentID=11586 3. San Francisco Department of Public Health Director's Rules and Regulations Regarding the Operation of Alternate Water Source Systems https://www.sfdph.org/dph/files/EHSdocs/ehsWaterdocs/NonPotable/SFHC_12C_Rules.pdf
Referenced Standards:	Risk-Based Framework for DNWS Report_Final; SFHC_12C Rules for Alternate Water Source Systems; NBRC Guidebook for Developing ONWS Regulations

WE-Stand 2020 – (204.0, 221.0, 225.0) Item #001

Name:	Pat Lando
Organization:	recodenow.org
Recommendation:	Add text
Section Number:	Chapter 2; 204.0, 221.0 and 225.0
Proposed Text:	**204.0 Blackwater**. See 221.0 Sewage **221.0 Sewage** Liquid containing animal or vegetable matter in suspension or solution and that may include liquids containing chemicals in solution. **225.0 Wastewater**. See 221.0 Sewage
Problem Statement:	As a member of the Alternative Water Task Group, I recommended not using the term *Blackwater* in the proposed We-Stand amendments, and in its place, using the term sewage. With just minutes before the closing of our last TG meeting, a vote was taken with limited members present, defeating the call for removing of the term blackwater. Following my dissenting vote, I have received many emails and letters supporting regarding this issue and implore IAPMO to review my specific proposal and reject using the term blackwater. Sewage shall be the preferred term for water often referred to as wastewater and/or blackwater. While working on a water infrastructure plan for The C.H. Wright Museum of African American History and Michigan Science Center, a person (who presented as a white woman) declared, "We need to find a new word for Blackwater." The entire room declared that they couldn't agree more. This included people from local organizations, the City of Detroit and the internationally recognized group leading the efforts for water rights over the Flint, MI water and housing crises: We the People of Detroit. Language is a reflection of culture and simultaneously it creates culture, so inclusive language can create an inclusive culture. Very often, our culture exhibits a bias for light and white as being something positive and dark or black being something negative or dirty. Almost all water is "dirty" and must be treated to appropriate levels for its intended end use. Why single out black water as the "most polluted?" But what the person from the Michigan Science Center was really asking us to change is how we reinforce negative stereotypes that are often unconsciously applied to people. We see this bias expressed in the disparities in outcomes any time an issue is studied using a racial lens. Blackwater, in addition to gray (grey), brown and yellow waters are colloquial terms which became popular in the 1970s to help describe different wastewaters, their treatment, and reuse. The term sewage has always defined all of these waters and still provides the most technical, basic and universal definition. The term "sewage" has slowly fallen out of favor since the 1970s to "wastewater" and then "blackwater". However, it should be noted that sewage has still maintained a role in describing systems; sewer, sewer pipes, sewage treatment plants and sewerage (British) rather than the material itself. With today's conservation focus, water reuse systems are on the rapid rise and in reaction, the term "wastewater" has now fallen out of favor. Moreover, social justice and equity-focused groups are re-examining the language that we use, and due to the fact that there are people of color, "black water", "brown water" and "yellow water" are now viewed as derogatory and unacceptable words. IAPMO should take the progressive leadership and make "sewage" the preferred, universal term. Pat Lando Executive Director Recode.org
Referenced Standards:	http://epubs.iapmo.org/2018/UPC/mobile/index.html#p=1

Name:	Jim Kendzel
Organization:	American Supply Association
Representing:	Chairman for WE-Stand Alternate Water Sources Task Group
Recommendation:	Add text
Section Number:	506.0

Proposed Text:

506.0 Onsite Stormwater Treatment Systems.

506.1 General. The provisions of this section shall apply to the water quality, monitoring, design, construction, alteration, repair, and operation requirements of onsite Stormwater treatment systems for non-potable use.

506.2 Allowable Use of Stormwater. Where approved or required by the Authority Having Jurisdiction, Stormwater shall be permitted to be used in lieu of potable water for uses such as, but not limited to, water closets, urinals, clothes washers, ornamental plant irrigation, and dust suppression.

506.3 System Design. Onsite Stormwater treatment systems shall be designed in accordance with this section by a licensed plumbing contractor, Registered Design Professional, or a person who demonstrates competency to design Stormwater treatment systems as required by the Authority Having Jurisdiction. Components, piping, and fittings used in any Stormwater system shall be listed.

506.4 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any Stormwater treatment system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.

506.5 Component Identification. System components shall be properly identified as to the manufacturer.

506.6 Material Compatibility. Stormwater treatment systems shall be constructed of materials that are compatible with the type of pipe and fitting materials, water treatment, and water conditions in the system.

506.7 Log Reduction Targets. Stormwater treatment systems shall be designed to meet the log reduction targets as set forth in Table 506.7. To meet the log reduction in Table 506.7, treatment processes used in Stormwater systems shall comply with 506.8 for validation or be operated according to conditions approved by the Authority Having Jurisdiction.

Table 506.7
LOG REDUCTION TARGETS FOR 10^{-4} INFECTIONS PER PERSON PER YEAR
BENCHMARKS FOR STORMWATER TREATMENT SYSTEMS

Water Use Scenario	Enteric Viruses	Parasitic Protozoa	Enteric Bacteria
Stormwater with 10% wastewater contribution[2]			
Ornamental plant irrigation[1]/dust suppression	5.0	4.5	4.0
Indoor Use	5.5	5.5	5.0
Stormwater with 0.1% wastewater contribution[2]			
Ornamental plant irrigation[1]/dust suppression	3.0	2.5	2.0
Indoor Use	3.5	3.5	3.0

[1] Non-food

[2] Stormwater can contain some quantity of municipal wastewater. The extent of wastewater present will depend on site-specific conditions. The appropriate Log_{10} Reduction Target (LRT) to apply for a Stormwater treatment system depend on the site-specific extent of likely contamination of Stormwater with municipal wastewater.

506.8 Validation. Where applicable, treatment processes shall be tested to verify their pathogen reduction performance. This can be accomplished through a validation test or by using a challenge test during field verification. The results of the validation test or challenge test shall be summarized in a validation report prepared by a Registered Design Professional. The validation report shall document the treatment technology's log reduction performance, including information on the operating conditions and surrogate parameters.

506.9 Health and Safety. Treated Stormwater shall not create a nuisance or odor, nor threaten human health, or damage the quality of surface water or groundwater.

506.10 Monitoring Requirements. Treatment processes that are used to meet a log reduction target shall have continuous monitoring using surrogate parameters to verify the pathogen reduction performance. Instrumentation with continuous monitoring capabilities shall be routinely calibrated.

506.11 Design and Installation. The design and installation of onsite Stormwater treatment systems shall meet the requirements of Section 505.11.1 through Section 505.11.6.

506.11.1 Connections to Potable or Reclaimed (Recycled) Water Systems. Stormwater treatment systems shall have no direct connection to any potable water supply or reclaimed (recycled) water source system. Potable water or reclaimed (recycled) water shall be permitted to be used as makeup water for a Stormwater treatment system provided the potable or reclaimed (recycled) water supply connection is protected by an airgap.

506.11.2 Bypass Connection. A bypass shall be provided for the input connection to the Stormwater treatment system. The bypass shall be a diverter valve normally open to the Stormwater treatment system. The normally closed port of the diverter valve shall be connected directly to the storm drainage system or combined sewer system according to the plumbing code.

506.11.3 Overflow Connection. Stormwater treatment overflow shall be connected directly to the storm drainage or combined sewer system according to the plumbing code. The overflow shall be provided with a backwater valve at the point of connection to the storm drainage or combined sewer system. The backwater valve shall be accessible for inspection and maintenance.

506.11.4 Fail-safe Mechanisms. Stormwater treatment systems must be equipped with features that result in a controlled and non-hazardous automatic shutdown of the treatment process in the event of a malfunction.

506.11.5 Flow Meter. Buildings with Stormwater treatment systems shall include a flow meter on the treated Stormwater distribution system and a flow meter on the potable make-up water pipeline to the Stormwater treatment system.

506.11.6 Cross-connection Inspection and Testing. A cross-connection test is required in accordance with Section 501.11. Before the building is occupied or the system is activated, the installer shall perform the initial cross-connection test in the presence of the Authority Having Jurisdiction. The test shall be ruled successful by the Authority Having Jurisdiction before final approval is granted.

506.12 Commissioning. Onsite Stormwater treatment systems shall meet the commissioning requirements of Section 505.12.1 through Section 505.12.6.

506.12.1 Commissioning Requirements. Commissioning for Stormwater treatment systems shall be included in the design and construction processes of the project. Commissioning shall be performed by a person who demonstrates competency in commissioning Stormwater treatment systems as required by the Authority Having Jurisdiction.

506.12.2 Commissioning Plan. A commissioning plan shall be included in the construction documents and shall be completed to document the approach to how the Stormwater treatment system will be commissioned and shall be started during the design phase of the project. The commissioning plan shall be approved by the Authority Having Jurisdiction prior

to commissioning the Stormwater treatment system. The commissioning plan shall include the following:

1) General project information.
2) Commissioning goals.
3) Equipment to be tested, including the extent of tests.
4) Functions to be tested.
5) Conditions under which the test shall be performed.
6) Measurable criteria for acceptable performance.
7) Commissioning team contact information.
8) Commissioning process activities, schedules, and responsibilities. Plans for the completion of functional performance testing, post construction documentation and training, and the commissioning report shall be included.

506.12.3 Functional Performance Testing. Functional performance tests shall demonstrate the correct installation and operation of the equipment of the Stormwater treatment system in accordance with the approved plans and specifications. Functional performance testing reports shall be prepared and contain information addressing the equipment tested, the testing methods utilized, and proof of proper calibration of the equipment. The units of measure used in functional performance testing shall be the type of unit measurement acceptable to the Authority Having Jurisdiction.

506.12.4 Systems Operations Training. The training of the appropriate maintenance staff for each component of the Stormwater treatment system shall include not less than the following:

1) Stormwater treatment system and equipment overview, including what each component is, what its function is, and what other systems or equipment it interfaces with.
2) Review of the information in the operations and maintenance manual.
3) Review of the record drawings on the system/equipment.

506.12.5 Commissioning Report. A complete report of commissioning process activities undertaken through the design, construction, and post-construction phases of the Stormwater treatment system shall be completed, provided to the owner of the Stormwater treatment system, and submitted to the Authority Having Jurisdiction upon completion of the commissioning of the Stormwater treatment system.

506.12.6 Certificate of Completion. The Authority Having Jurisdiction shall not issue the final certificate of completion until the commissioning report has been submitted and approved. Copies of the commissioning report are required to be posted, or made available with the permit(s), and shall be made available to the Authority Having Jurisdiction at any time upon request.

506.13 Operation and Maintenance Manual. An operation and maintenance manual shall be provided in accordance with Section 501.6 and shall also include the following:

1) Instructions on operating and maintaining the system, including treatment process operations, instrumentation and alarms, and chemicals storage and handling.
2) Site equipment inventory and maintenance notes.
3) Equipment/system warranty documentation and information.
4) "As-Built" design drawings.
5) Details on training requirements and qualifications of personnel responsible for operating the system.
6) Maintenance schedule.

506.14 Inspection. Field inspections shall take place during and after construction while the contractor is on-site to verify that the Stormwater treatment system components have been properly supplied and installed according to the plans and specifications used for installation. Record drawings shall be maintained with changes to the approved plans by the contractor and available for periodic inspection as needed.

Add the following Definitions:
203.0

	Air Gap, Drainage. The unobstructed vertical distance through the free atmosphere between the lowest opening from a pipe, plumbing fixture, appliance, or appurtenance conveying waste to the flood-level rim of the receptor. **Air Gap, Water Distribution.** The unobstructed vertical distance through the free atmosphere between the lowest opening from a pipe or faucet conveying potable water to the flood-level rim of a tank, vat, or fixture. **204.0** **Challenge Test.** The evaluation of a unit treatment process for pathogen log_{10} reduction performance using selected surrogate or indigenous constituents. **Continuous Monitoring.** Ongoing confirmation of system performance using sensors for continuous observation of selected parameters, including surrogate parameters that are correlated with pathogen log reduction target requirements. **Cross-connection.** A connection or arrangement, physical or otherwise, between a potable water supply system and a plumbing fixture or a tank, receptor, equipment, or device, through which it may be possible for nonpotable, used, unclean, polluted, and contaminated water, or other substances to enter into a part of such potable water system under any condition. **208.0** **Field Verification.** Performance confirmation study conducted using challenge testing, including surrogate microorganisms and/or other non-biological surrogates, usually during startup and commissioning and may be repeated as needed. The need for, duration, and extent of the field verification procedure will depend on characteristics of the Stormwater treatment system. **214.0** **Log_{10} Reduction.** The removal of a pathogen or surrogate in a unit process expressed in log_{10} units. A 1-log reduction equates to 90% removal, 2-log reduction to 99% removal, 3-log reduction to 99.9% removal, and so on. **Log_{10} Reduction Target (LRT).** The log_{10} reduction target for the specified pathogen group (e.g., viruses, bacteria, or protozoa) to achieve the identified level of risk to individuals (e.g., 10^{-4} infection per year). **221.0** **Surrogate**. A biological, chemical, or physical parameter used to verify pathogen reductions performances. **224.0** **Validation Test.** Detailed technology evaluation study that was conducted to challenge the treatment technology over a wide range of operational conditions. **Validation Report.** Report documenting the results of a validation test or challenge test conducted during field verification.
Problem Statement:	The Alternate Water Task Group (AWTG) proposes comprehensive requirements related to the water quality, monitoring, design, construction, commissioning, alteration, repair, and operation requirements of blackwater and stormwater systems for non-potable water reuse. These requirements for a properly designed system, together with appropriate construction, operation, and maintenance, will help ensure blackwater and stormwater systems will be implemented safely and reliably. The AWTG proposes to incorporate health risk-based water quality requirements for blackwater and stormwater systems. The risk-based water quality approach was developed through recent research by the National Water Research Institute (NWRI) and the Water Research Foundation (WRF), culminating in the report Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems. Utilizing similar methodology as is employed in potable reuse and drinking water regulations, the risk-based LRTs align with the Water Safety Plan approach promoted by the World Health Organization. Blackwater and stormwater may contain pathogenic microorganisms that, if not properly treated, can cause infection due to exposure to these waters when recycled and used onsite. The intent of the risk-based framework is to determine the appropriate level of treatment for pathogens that is needed to protect public health, accounting for such factors as the source water quality, specific end use, and acceptable risk of infection from exposure to the treated water. The risk threshold used for this application is the same as has been previously applied in the context of municipal drinking water, i.e. exposure to this water via toilet flushing, irrigation,

	and other nonpotable uses poses no greater risk than drinking municipally supplied drinking water. Because the amount of pathogen reduction for reuse usually spans orders of magnitude, pathogen treatment requirements are specified in terms of $\log_{10}$ reduction; 1-$\log_{10}$ reduction equates to 90% removal, 2-$\log_{10}$ reduction to 99% removal, 3-$\log_{10}$ reduction to 99.9% removal, and so on. The treatment requirements developed using the risk-based methodology in this case are called log reduction targets, or LRTs. The LRTs were developed using a Quantitative Microbial Risk Assessment (QMRA). QMRA is a scientific approach to estimating the potential human health risks associated with exposure to microbial hazards (in this case, human pathogenic viruses, bacteria, and protozoa). LRTs for blackwater and stormwater reuse for unrestricted irrigation and toilet flushing were developed based on the annual risk level of 10-4 infections per person per year. Unit treatment processes that are effective at removing and/or inactivating pathogens can be used to meet the LRTs. In most cases, several unit processes are needed in series to provide sufficient treatment. The ability of unit processes to provide a certain level of treatment is verified through the use of ongoing monitoring and, in some cases, validation. For some unit processes, validation is critical to determine how the process can be used to achieve the LRTs. The AWTG also proposes to incorporate a monitoring approach for blackwater and stormwater systems that aligns with the research. The framework for monitoring deviates from traditional approaches of monitoring fecal indicator organisms (FIOs) in grab samples because there are recognized limitations of using FIOs. The primary limitation of FIO monitoring is that it cannot be done continuously to ensure safe water is delivered to the end use at all times. Rather, the AWTG is proposing continuous water quality monitoring of surrogate parameters such as turbidity, residual chlorine, ultraviolet transmittance, and others to verify that treatment processes are operating as designed. Discussion: The AWTG supports the use of a health risk-based approach to guide treatment and design requirements for blackwater and stormwater systems because it ensures that systems implemented using this framework are safe and reliable. The requirements being proposed are intended to ensure that public health is protected while still allowing for flexibility in design, as it does not prescribe that specific treatment processes must be used. It is timely that AWTG is proposing these requirements because several states have recently moved forward to adopt the risk-based framework at the state level. Much of this work has been driven by the work of the National Blue Ribbon Commission for Onsite Nonpotable Water Systems, a coalition of public health agencies and water and wastewater utilities committed to advancing the safe, practical, and sustainable implementation of alternate water source systems. As a result of the Commission's work, several states including California, Colorado, Minnesota, Oregon, Washington, and Hawaii are proposing legislation to adopt the risk-based approach. Therefore, institutionalizing the risk-based approach in WE•Stand will create further consistency across the country by aligning plumbing and health code requirements for alternate water source systems. Resources: The AWTG used the following resources to develop the proposed text for both stormwater and blackwater treatment systems. These resources provided the AWTG with a technically sound template for the development of requirements for blackwater and stormwater treatment systems that fit well into the both the scope and format structure of model codes used by WE•Stand. 1. Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems https://www.werf.org/a/ka/Search/ResearchProfile.aspx?ReportId=SIWM10C15 2. A Guidebook for Developing and Implementing Regulations for Onsite Non-potable Water Systems developed by the National Blue Ribbon Commission for Onsite Non-Potable Water Systems https://sfwater.org/Modules/ShowDocument.aspx?documentID=11586 3. San Francisco Department of Public Health Director's Rules and Regulations Regarding the Operation of Alternate Water Source Systems https://www.sfdph.org/dph/files/EHSdocs/ehsWaterdocs/NonPotable/SFHC_12C_Rules.pdf
Referenced Standards:	Risk-Based Framework for DNWS Report_Final; SFHC_12C Rules for Alternate Water Source Systems; NBRC Guidebook for Developing ONWS Regulations

WE-Stand 2020 – (603.14) Item # 053

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	603.14
Proposed Text:	**603.14 Inspection and Testing.** Rainwater catchment systems shall be inspected and tested in accordance with Section 603.14.1 ~~and~~. When any portion of the rainwater catchment system is located indoors, or if the system includes a pump, the system shall be inspected and tested in accordance with Section 603.14.2.
Problem Statement:	Cross-connection testing and inspection should be required for any system that has potential for cross-connection. Some systems are isolated from any potable water system and non-pressurized, and so would not require cross-connection testing. I included a qualifier to clarify which systems would and would not require such testing.
Referenced Standards:	

Name:	Tim Keane
Organization:	Legionella Risk Management, Inc.
Recommendation:	Revise text
Section Number:	702.2
Proposed Text:	**Recirculation Pump Controls**. Pump controls shall include on-demand activation, variable-frequency drive (VFD), or time clocks combined with temperature sensing. Time clock controls for pumps shall not let the pump operate more than 15 minutes every hour. Temperature sensors shall stop or reduce circulation when the temperature set point is reached and shall be located on the circulation loop at or near the last fixture. Where one pump supplies circulation for more than one loop then temperature sensors shall be located near the last fixture on each loop. The pump, pump controls and temperature sensors shall be accessible. Pump operation shall be limited to the building's hours of operation as long as that does not impact risk for waterborne pathogens such as Legionella growth.
Problem Statement:	Present section does not include new technology which saves energy and reduces legionella risk, VFD technology. Stopping water completely especially for prolonged periods of time could increase risk for Legionella growth. Section requires only one temperature sensor, in hot water systems where one pump circulates water through multiple loops say east and west wing of a building then there should be a temperature sensor at the last fixture in the east wing and the last fixture in the west wing. Presently OSHA says hot water return pumps should circulate continuously to control Legionella risk. That is way to general a statement. If hot water system is not used for a prolonged period of time then turning off pumps could be beneficial if hot water in the circulating system is maintained at 80F or less while the system is not circulating. So a school in the North or Northeast that is closed from Friday at 5 pm to Monday at 6AM could turn down thermostat to 65F and shut off circulating pump of hot water and hot water will go down to 75F or less would lower the risk for waterborne pathogens. If in Miami, Phoenix, Dallas or San Diego turning off hot water circ pumps could increase risk because ambient room temperature in buildings may be above 80F
Referenced Standards:	OSHA Technical Manual (OTM) - Section III_ Chapter VII_ Legionnaires' Diseas.pdf

Name:	Pat Lando
Organization:	recode.org
Recommendation:	Add text
Section Number:	705.3
Proposed Text:	**Energy Source Selection.** Where available, water heating equipment shall meet one of the following Tiers when selecting an energy source: (1) Tier 1 Non-fossil Fuel (2) Tier 2 Maintain Highest Water Quality (3) Tier 3 Lowest Emissions: 1. C02 emissions 2. Lowest air emissions a. Sulfur oxides (SOx) b. Nitrogen oxides (NOx) c. Particulate matter (PM) d. Others: 1. Carbon Monoxide (CO) 2. Volatile Organic Compounds (VOC's) 3. Ground-Level Ozone (O3) 4. Heavy Metals 5. Waste Incineration 6. Mercury 3. Exposure to Emissions: Lowest population exposed to emissions (4) Tier 4 Highest Energy conversion efficiency Renumber remaining sections
Problem Statement:	Substantiation: We must start addressing the water | energy nexus in our code language and the WE-Stand document is an excellent place to start. During the Task Group's discussion on water heater selection, the group revealed that the current WE--Stand code omits guidance and/or a requirement when choosing an energy source for the water heater when this is a locally available option. The proposal creates a tiered selection process placing the most sustainable and least damaging energy source at the top of the tier selection process, and the most unwanted at the bottom. The tiers use non-fossil fuel sources as the best fuels. The next best fuels preserve water quality and they are followed by fuels that omit and expose the least amount emissions. Lastly, fuels that are efficient at creating energy are the next best of options.
Referenced Standards:	

WE-Stand 2020 – (705.4.3) Item # 056

Name:	Tim Keane
Organization:	Legionella Risk Management, Inc.
Recommendation:	Add text
Section Number:	705.4.3
Proposed Text:	**705.4.3 Remote Sinks**. Where a sink is remotely located at least 150 feet (46 m) from any other plumbing fixtures and appliances, the hot water shall be supplied by an instantaneous hot water heater.
Problem Statement:	Long potable hot water supply and return runs to sinks not near other potable water use locations adds a lot of dedicated circulating water both supply and return and associated heat loss to a single sink. Other issues with this are balancing problems, installation costs and potential for Legionella growth due to circulation and use issues. Lobby sinks for instance in hospitals, hotels and office buildings are frequently no where near pipe runs.
Referenced Standards:	

WE-Stand 2020 – (705.5.1) Item # 057

Name:	Tim Keane
Organization:	Legionella Risk Management, Inc.
Recommendation:	Revise text
Section Number:	705.5.1
Proposed Text:	**705.5.1 Temperature Controls.** Temperature controls shall be provided that allow for storage temperature adjustment ~~from 120°F (49ºC) or lower~~ to a maximum temperature compatible with the intended use but not to exceed 150°F (66°C).
Problem Statement:	Add but not to exceed 150F Hot water supply and return lines represent the greatest heat loss in the potable hot water system. The greater the temperature above ambient, the greater the heat loss. Codes recommend greater than or equal to 140F in stored water for control of Legionella. There is no benefit for circulating water above 150F. Delete from 120F or lower Because I have no idea what that means.
Referenced Standards:	OSHA Technical Manual – Section III, Chapter VII, Legionnaires Disease; CDC Environmental Infection Control Guideline 2003; ASHRAE Guideline 12-2000 Potable Treatment

WE-Stand 2020 – (705.5.1) Item # 058

Name:	Tim Keane
Organization:	Legionella Risk Management Inc.
Recommendation:	Revise text
Section Number:	705.5.1
Proposed Text:	**705.5.1 Storage Temperature Controls.** Storage t~~T~~emperature controls shall be provided that allow for storage temperature adjustment from 120°F (49ºC) or lower to a maximum temperature compatible with the intended use.
Problem Statement:	705.5.2 is titled Outlet Temperature Controls. 705.5.1 to be consistent and clear should be titled Storage Temperature Controls.
Referenced Standards:	

WE-Stand 2020 – (705.5.2) Item # 059

Name:	Tim Keane
Organization:	Legionella Risk Management, Inc.
Recommendation:	Revise text
Section Number:	705.5.2
Proposed Text:	**705.5.2 Outlet Temperature Controls**. Temperature controlling means shall be provided to limit the maximum temperature of water delivered; 1) from hot water heaters to potable water supply for hand washing sinks and showers to 135°F (57°C) and 2) from lavatory faucets in public facility restrooms to 110°F (43°C). ~~[ASHRAE 90.1:7.4.4.3]~~
Problem Statement:	The document already discusses turning off hot water return to limit energy loss. Another key issue is keeping potable hot water in supply and return piping as the lowest possible temperature. There is no reason to maintain potable water being circulated in supply and return lines to sinks and showers at greater than 135F. Places where potable water is desired to have higher temperatures, kitchen sinks and laundry typically have either separate runs from the boiler or booster heaters.
Referenced Standards:	

WE-Stand 2020 – (708.1) Item # 060

Name:	Tim Keane
Organization:	Legionella Risk Management, Inc.
Recommendation:	Revise text
Section Number:	708.1
Proposed Text:	**708.1 Softening and Treatment.** Where water has hardness equal to or exceeding 10 gr/gal (171 mg/L) measured as total calcium carbonate equivalents, the cold water supply line to water heating equipment and the circuit of boilers shall be softened or treated to prevent accumulation of lime scale and consequent reduction in energy efficiency. Cold water supply to potable water heaters shall be softened to no less than 2 gr/gal.
Problem Statement:	Oversizing softeners results in larger volumes of stored water in the resin tank, longer retention times, greater reduction in disinfectant levels, larger volumes of water used in regeneration than is necessary for the application and more frequent regeneration than necessary. Undersizing water softeners reduces water use, improves water quality. Softeners should not be sized to remove 100% of hardness for potable water applications. Completely soft water is more corrosive and requires much more salt and regenerations. Softening down to 2 gpg or higher reduces regenerations, salt consumption, salt discharge and corrosion.
Referenced Standards:	

Name:	IAPMO Staff – Update Extracts
Recommendation:	Revise text
Section Number:	Chapter 7
Proposed Text:	**702.1.1 For Low-Rise Residential Buildings.** Circulating hot water systems shall be arranged so that the circulating pump(s) can be turned off (automatically or manually) when the hot water system is not in operation. ~~[ASHRAE 90.2:7.2]~~ **703.2 Water Heaters and Storage Tanks.** Residential-type water heaters, pool heaters, and unfired water heater storage tanks shall meet the minimum performance requirements specified by federal law. Unfired storage water heating equipment shall have a heat loss through the tank surface area of less than 6.5 British thermal units per hour per square foot (Btu/h•ft^2) (20.5 W/m^2). ~~[ASHRAE 90.2:7.1]~~ **703.4 Central Water Heating Equipment.** Service water heating equipment (central systems) that does not fall under the requirements for residential-type service water heating equipment addressed in Section 703.0 shall meet the applicable requirements for service water-heating equipment found in Section 704.0. ~~[ASHRAE 90.2:7.3]~~

TABLE 901.1 REFERENCED STANDARDS

STANDARD NUMBER-YEAR	STANDARD TITLE	REFERENCED SECTION
~~ASHRAE 90.2-2007~~	~~Energy Efficient Design of Low-Rise Residential Buildings~~	~~702.1.1, 703.2, 703.4~~

Remainder of table remains the same.

Problem Statement:	The above extract citations have been removed in accordance the Extract Guidelines in the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard. ASHRAE 90.2-2018 no longer contains these extracts.
Referenced Standards:	ASHRAE 90.2-2018

WE-Stand 2020 – (Table 901.1) Item # 062

Name:	IAPMO Staff
Organization:	
Recommendation:	Edit text
Section Number:	Table 901.1

Proposed Text:

TABLE 901.1 REFERENCED STANDARDS

STANDARD NUMBER-YEAR	STANDARD TITLE	REFERENCED SECTION
AHRI 1160 (I-P)-2014	Performance Rating of Heat Pump Pool Heaters	Table 705.2
APSP-14 2014*	Portable Electric Spa Energy Efficiency	418.3.1
APSP-15a-2013*	Residential Swimming Pool and Spa Energy Efficiency	418.5
ARCSA/ASPE 63-2013*	Rainwater Catchment Systems	602.1, A 104.9.1
ASABE/ICC 802-2014*	Landscape Irrigation Sprinkler and Emitter Standard	415.7, 415.12
ASHRAE 90.1-2016 (I-P)*	Energy Standard for Buildings Except Low-Rise Residential Buildings	702.1.2, 702.3, 704.2, 704.3, 704.4, 704.5, 704.6, 705.1, 705.2, Table 705.2, 705.5, 705.6
~~ASHRAE 90.2-2007~~	~~Energy Efficient Design of Low-Rise Residential Buildings~~	~~702.1.1, 703.2, 703.4~~
ASHRAE 146-2011*	Method of Testing Pool Heaters	Table 705.2
ASME A112.18.1/CSA B125.1- ~~2012~~ 2018*	Plumbing Supply Fittings	402.5.1, 402.5.2.1, 402.6
ASME A112.19.2/CSA B45.1- ~~2013~~ 2018*	Ceramic Plumbing Fixtures	402.2.1, 402.2.2, 402.3
ASME A112.19.3/CSA B45.4- ~~2008 (R2013)~~ 2017*	Stainless Steel Plumbing Fixtures	402.3.1
ASME A112.19.14-2013 (R2018)*	Six-Liter Water Closets Equipped With a Dual Flushing Device	402.2.1
ASME A112.19.19-~~2006 (R2011)~~ 2016*	Vitreous China Nonwater Urinals	402.3.1
ASSE 1016/ASME A112.1016/ CSA B125.16-~~2011~~ 2017*	Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations	402.8
ASTM F2831-2012 (R2017)*	Standard Practice for Internal Non Structural Epoxy Barrier Coating Material Used in Rehabilitation of Metallic Pressurized Piping Systems	303.2
CFR 49, 178.274	Specifications for UN Portable Tanks	403.8.4.1.3, 403.9.11.4

CSA B45.5/IAPMO Z124-~~2011~~ 2017*	Plastic Plumbing Fixtures	402.3, 402.3.1
CSA B651-~~2012~~ 2018	Accessible Design for the Built Environment	402.6.1(2)
CSA Z21.10.3-~~2014~~ 2017*	Gas Water Heaters, Volume III, Storage Water Heaters With Input Ratings Above 75 000 BTU per Hour, circulating and Instantaneous (same as CSA 4.3)	Table 705.2
EPA/625/R-04/108-2004	Guidelines for Water Reuse	501.7, A 101.7
EPA/625/R-92/013-2003	Control of Pathogens and Vector Attraction in Sewage Sludge	403.8.5.2
EPA WaterSense-2007	High-Efficiency Lavatory Faucet Specification, Version 1.0	402.5.1
EPA WaterSense-2009	Specification for Flushing Urinals	402.3, Table 402.1
EPA WaterSense-2010	Specification for Showerheads	402.6
EPA WaterSense-2011	Specification for Weather-Based Irrigation Controllers	415.5
EPA WaterSense-2013	Specification for Commercial Pre-Rinse Spray Valves	402.9
EPA WaterSense-2014	Specification for Tank-Type Toilets	402.2.1, Table 402.1
EPA WaterSense-2015	Specification for Flushometer Valve Water Closets	402.2.2
IAPMO IGC 115-2013	Automatic Water Leak Detection and Control Devices	409.1
IAPMO IGC 207-2009a	Reclaimed Water Conservation System for Flushing Toilets	504.7
IAPMO PS 76-2012a	Trap Primers for Fill Valves and Flushometer Valves	416.1
IAPMO PS 92-2013e1	Heat Exchangers and Indirect Water Heaters	709.0
IAPMO UMC ~~2015~~ 2018*	Uniform Mechanical Code	101.6.3
IAPMO UPC ~~2015~~ 2018*	Uniform Plumbing Code	103.6.4
IAPMO ~~USEC~~ USHGC ~~2015~~ 2018*	Uniform Solar, Hydronics and Geothermal ~~Energy~~ Code	101.6.5
IAPMO USPSHTC-~~2015~~ 2018*	Uniform Swimming Pool, Spa, and Hot Tub Code	101.6.6
ICC A117.1-~~2009~~ 2017*	Accessible and Usable Buildings and Facilities	402.6.1(2)
NSF 14-~~2016b~~ 2018*	Plastics Piping System Components and Related Materials	302.1.1
NSF 41-~~2011~~ 2018*	Non-Liquid Saturated Treatment Systems	403.2.1
NSF 44-~~2014~~ 2018*	Residential Cation Exchange Water Softeners	406.1
NSF 53-~~2014~~ 2017*	Drinking Water Treatment Units – Health Effects	A 104.3.1
NSF 58-~~2015~~ 2017*	Reverse Osmosis Drinking Water Treatment Systems	406.3

	<table><tr><td>NSF 61-~~2015a~~ 2017*</td><td>Drinking Water Systems Components - Health Effects</td><td>A 103.2, A 104.5.1</td></tr><tr><td>NSF 350-~~2014~~ 2017*</td><td>Onsite Residential and Commercial Reuse Treatment Systems</td><td>501.7, 504.7</td></tr><tr><td>NSF P151-~~1995~~ 2014</td><td>Health Effects from Rainwater Catchment System Components</td><td>A 103.1, A 103.2</td></tr><tr><td>WQA/ASPE S-803-~~2014~~ 2017*</td><td>Sustainable Drinking Water Treatment Systems</td><td>406.4</td></tr></table> (portions of table not shown remain unchanged)
Problem Statement:	To update referenced standards to the most current documents.
Referenced Standards:	

<table>
<tr><td>Name:</td><td>Laura Allen</td></tr>
<tr><td>Organization:</td><td>Greywater Action</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Recommendation:</td><td>Revise text</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Section Number:</td><td>Table A 101.5.1</td></tr>
<tr><td>Proposed Text:</td><td>
TABLE A 101.5.1
MINIMUM POTABLE RAINWATER CATCHMENT SYSTEM TESTING, INSPECTION AND MAINTENANCE FREQUENCY
<table>
<tr><th>Description</th><th>Minimum Frequency</th></tr>
<tr><td>Inspect and clean filters and screens, and replace (if necessary)</td><td>Every 3 months</td></tr>
<tr><td>Inspect and verify that disinfection, filters, and water quality devices and systems are operational. Perform any water quality tests as required by the Authority Having Jurisdiction.</td><td>In accordance with the manufacturer's instructions, and the Authority Having Jurisdiction.</td></tr>
<tr><td><s>Perform applicable water quality tests to verify compliance with Section A104.2</s></td><td><s>Every 3 months</s></td></tr>
<tr><td>Perform a water quality test for <s>E. Coli,</s> Total Coliform<s>, and Heterotrophic bacteria</s>. <u>If total coliform test is positive perform a test for E. coli.</u> For a system where 25 different people consume water from the system over a 60 day period, a water quality test for cryptosporidium shall also be performed.</td><td>After initial installation and every 12 months thereafter, or as directed by the Authority Having Jurisdiction.</td></tr>
</table>
(Remaining table stays the same)
</td></tr>
<tr><td>Problem Statement:</td><td>This table has multiple requirements for maintaining water quality. I propose to remove the one line of the table that points to another table with unobtainable testing requirements. With my revision the table requires water quality to be protected in three ways. 1) By complying with "inspect and verify that disinfection, filters and water quality treatment devices and systems are operational" the water will be safe to drink because these treatment devices are certified to remove pathogens and contaminants and to create potable water. 2) To "Perform any water quality tests as required by the Authority Having Jurisdiction" will allow the local AHJ to require testing for any known pollutants or contaminants in that area. 3) To "Perform a water quality test for E. coli, total coliform, and heterotrophic bacteria. If total coliform test is positive perform a test for E. coli" also requires water quality testing to ensure the system is safe for drinking. This is in line with EPA requirements for bacterial testing for public water systems (if their total coliform test if positive, then they test for E. coli.)</td></tr>
<tr><td>Referenced Standards:</td><td>EPA Factsheet-to-coliform-rule-ZyPDF</td></tr>
</table>

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	A 101.7
Proposed Text:	**A 101.7 Minimum Water Quality Requirements.** The minimum water quality for all potable rainwater catchment systems shall meet the applicable water quality requirements as determined by the Authority Having Jurisdiction for private wells. ~~In the absence of water quality requirements, the guidelines EPA/625/R-04/108 contains recommended water reuse guidelines to assist regulatory agencies develop, revise, or expand alternate water source water quality standards.~~
Problem Statement:	Seeing as most AHJs won't have water quality requirements for rainwater, well water would be the most similar water system they could look to. I looked through EPA/625/R-04/108 and it does not appear to be relevant to this chapter and so should be removed. The EPA guideline is about water reuse from municipal wastewater treatment plants and does not offer guidance on minimum water quality requirements for a potable rainwater system. Quoting the EPA document: "The 2004 Guidelines for Water Reuse examines opportunities for substituting reclaimed water for potable water supplies where potable water quality is not required." and "While direct potable reuse may not be considered a viable option at this time, many states are moving forward with indirect potable reuse projects." I could find nothing in the guideline that would help a local agency develop standards for a potable rainwater system.
Referenced Standards:	

<table>
<tr><td>Name:</td><td>Laura Allen</td></tr>
<tr><td>Organization:</td><td>Greywater Action</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Recommendation:</td><td>Revise text</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Section Number:</td><td>Table A 104.2.1</td></tr>
<tr><td>Proposed Text:</td><td>Table A 104.2.1
Minimum Water Quality

<table><tr><td>Escherichia coli (fecal coliform):</td><td>Non-detectable</td></tr><tr><td><s>Protozoan Cysts:</s></td><td><s>Non-detectable</s></td></tr><tr><td><s>Viruses:</s></td><td><s>Non-detectable</s></td></tr><tr><td>Turbidity:</td><td><0.3 NTU</td></tr></table></td></tr>
<tr><td>Problem Statement:</td><td>The broad and general testing requirements for "viruses" and "protozoan cysts" currently found in Table A 104.2.1 for potable rainwater systems are not possible to meet, and they are not needed for meeting the goal of keeping rainwater safe to drink. No one (agency, public water supplier, water lab, etc.) does broad scale testing for all viruses and protozoan cysts. Even testing for a few types of actual viruses isn't required until a public water system serves over 100,000 people. Bottled water regulations does not require tests for any viruses at all. "Under the current bottled water quality standard, FDA has established a microbiological quality requirement that is based on coliform detection levels." Bottled water comes from a variety of sources, is stored for long periods of time and is solely tested for safety by total coliform levels. No place that permits potable rainwater systems even attempts to require broad scale virus and protozoan cyst testing. San Juan County in Washington, and Oregon Appendix M, requires standard coliform tests every 6 months, and they require filtration certified to remove viruses and cysts. WE-Stand should require bacterial testing as an indicator of potential pathogens as an way to keep rainwater systems safe and to be in-line with the US EPA (drinking water standards for various sized systems), USDA (bottle water standards), and places that permit potable rainwater systems. Table A 104.2.1 says to test for "viruses" and "protozoan cysts" but does not specify which ones. There are no water quality laboratories that offer testing for all types of viruses and protozoan cysts. General pathogen tests cover only 2 types of protozoan cysts (Giardia and Cryptosporidium) while there are tens of thousands of types of protozoa and they are found nearly everywhere on earth: Most are not harmful. According to the book, "Medical Microbiology" chapter 77 by Robert Yaeger, "Virtually all humans have protozoa living in or on their body at some time, and many persons are infected with one or more species throughout their life. Some species are considered commensals, i.e., normally not harmful, whereas others are pathogens and usually produce disease." According to the Center for Disease Control, "Nonpathogenic intestinal protozoa are single-celled parasites commonly found in the intestinal tract but never associated with illness. They do not harm the body, even in people with weak immune systems. Symptomatic people who are found to have these protozoa in their stool should be examined for other causes of their symptoms. The nonpathogenic intestinal protozoa include: Chilomastix mesnili, Endolimax nana, Entamoeba coli, Entamoeba dispar, Entamoeba hartmanni, Entamoeba polecki, Iodamoeba buetschlii. (https://www.cdc.gov/parasites/nonpathprotozoa/index.html) As you can see, not only would it be impossible to test for all protozoans that create cysts, it would not be useful information because there are many types that are not harmful to humans. That said, there are a number of protozoan pathogens that are human parasites, causing diseases such as</td></tr>
</table>

	malaria (by Plasmodium), amoebiasis, giardiasis, toxoplasmosis, cryptosporidiosis, trichomoniasis, Chagas disease, leishmaniasis, African trypanosomiasis (sleeping sickness), amoebic dysentery, acanthamoeba keratitis, and primary amoebic meningoencephalitis (naegleriasis). Is the table meaning to test for all these? Clearly it would not be logical to test for pathogens that are not found in most places, such as African trypanosomiasis which is only found in Subsaharan Africa. So what protozoan cysts does the table intend for people to test for? What about the potential to test for viruses? There are literally millions of types of viruses. Viruses are found everywhere on Earth. Last year scientists published a paper in the International Society of Microbial Ecology Journal and reported that 800 million viruses, mainly of marine origin, are deposited daily from the Earth's atmosphere onto every square meter of the planet's surface. There is literally a global atmospheric stream distributing viruses around the planet. Should we be testing for all these? https://www.nytimes.com/2018/04/13/science/virosphere-evolution.html And not all viruses are harmful, in fact, most aren't. According to Dr. Suttle, author of the report, "Mostly thought of as infectious agents, viruses are much more than that. It's hard to overstate the central role that viruses play in the world: They're essential to everything from our immune system to our gut microbiome, to the ecosystems on land and sea, to climate regulation and the evolution of all species." "Viruses aren't our enemies," Dr. Suttle said. "Certain nasty viruses can make you sick, but it's important to recognize that viruses and other microbes out there are absolutely integral for the ecosystem." We clearly can not be testing for the millions of viruses falling on the earth every moment, but should we be testing for specific disease causing viruses? Many viruses infect humans, such as smallpox, rabies, the common cold, influenza, chickenpox, and cold sores. Many serious diseases such as Ebola virus disease, AIDS, avian influenza, and SARS are caused by viruses. Should we be testing for the Ebola virus in a rainwater system? Viruses are spread in different ways. Influenza viruses are spread by coughing and sneezing. Norovirus and rotavirus, are transmitted by the faecal-oral route and are passed from person to person by contact, entering the body in food or water. HIV is one virus transmitted through sexual contact and by exposure to infected blood. Should we be testing for only viruses that are pathogens to humans and passed through water? Or are we worried about influenza, chickenbox, and HIV viruses on the roof of a house getting into a rainwater system? Table A 104.2.1 does not specify. A few water quality laboratories offer tests for some general types of viruses. The "Total Culturable Viruses" tests for enteric viruses only and the "Total Culturable Viruses and Molecular Analysis" tests for Enteric viruses, Enteroviruses and Noroviruses. These are just a minute fraction of the potential viruses that could be found in water. Is this what the table intends us to test for? What entities actually tests for viruses in drinking water, as opposed to testing for indicator organisms? States and counties that permit potable rainwater systems like San Juan County in Washington and Oregon do not require virus testing. (They require bacterial indicator organism testing, which if found, signifies that viruses could be present.) The US EPA recommends bacterial indicator organisms to be tested for potential microbial contamination of drinking water. They specifically require public water systems to test for total coliforms and to follow up any positive tests with an e.coli test. (Total coliform come from many sources and are typically not harmful, but indicate potential contamination, hence the requirement for e. coli test which shows if there is fecal contamination which would indicate potential pathogens.) Two types of protozoan cysts are required to be tested for in public water systems supplying to over 10,000 people by the EPA: giardia and cryptosporidium. Public water systems supplying water to over 100,000 people must also test for total culturable viruses (which only represent a minute fraction of potential viruses in the water). There are no testing requirements for private water systems serving less than 15 service connections. To keep potable rainwater systems safe we need logical, science-based, attainable testing requirements of indicator organisms (total coliforms followed with e. coli) as well as to require a treatment train of filters and disinfection that would nullify any potential pathogen in the system. (On-line source for EPA requirements for virus testing found here and uploaded: https://eal-labs.com/enteric-viruses-epa600r-95178-s-viii-reference/) On-line Sources: Bottled water testing:

	https://www.fda.gov/food/foodscienceresearch/laboratorymethods/ucm064948.htm#water EPA recommendations for using coliform for drinking water: https://www.epa.gov/dwreginfo/revised-total-coliform-rule-and-total-coliform-rule The Environmental Protection Agency (EPA) published the Revised Total Coliform Rule (RTCR) in the Federal Register (FR) on February 13, 2013 (78 FR 10269) and minor corrections on February 26, 2014 (79 FR 10665). The RTCR revises the 1989 Total Coliform Rule (TCR) and is intended to improve public health protection. Find EPA rule here: https://www.govinfo.gov/content/pkg/FR-2013-02-13/pdf/2012-31205.pdf
Referenced Standards:	EPA-Factsheet-to-coliform-rule-ZyPDF; EPA-Rule-Coliforms-Drinking-Water2012-31205; EPATestingforViruses-pdf053; Oregon Building Code Appendix M_201203271127100269(1); Rainwater Catchment PacketSanJuan

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	A. 104.2.3
Proposed Text:	**A 104.2.3 Maintenance.** Normal system maintenance shall require system testing for Escherichia coli (fecal coliform) and turbidity every 3 months in accordance with Table A 104.2.3. Upon failure of the fecal coliform test, system shall be re-commissioned involving cleaning, and retesting in accordance with section A 104.2. ~~Testing for viruses and cysts shall occur once after 3 months of initial operation and once every 12 months thereafter.~~ ~~**Exception:** Upon failure of the virus or cyst test, the tests will be repeated every 3 months until the tests results are negative for two consecutive tests.~~
Problem Statement:	There are no general tests for viruses and cysts, this requirement is impractical and would not improve safety. Testing for bacterial indicators is required by US EPA for drinking water systems under 10,000 people and for all bottled water. Please review lengthy substantiation below, which is identical to previous substantiation for Table A 104.2.1 (Please note that the supporting material was uploaded for the previous submission for Table A 104.2.1) The broad and general testing requirements for "viruses" and "protozoan cysts" currently found in Table A 104.2.1 for potable rainwater systems are not possible to meet, and they are not needed for meeting the goal of keeping rainwater safe to drink. No one (agency, public water supplier, water lab, etc.) does broad scale testing for all viruses and protozoan cysts. Even testing for a few types of actual viruses isn't required until a public water system serves over 100,000 people. Bottled water regulations does not require tests for any viruses at all. "Under the current bottled water quality standard, FDA has established a microbiological quality requirement that is based on coliform detection levels." Bottled water comes from a variety of sources, is stored for long periods of time and is solely tested for safety by total coliform levels. No place that permits potable rainwater systems even attempts to require broad scale virus and protozoan cyst testing. San Juan County in Washington, and Oregon Appendix M, requires standard coliform tests every 6 months, and they require filtration certified to remove viruses and cysts. WE-Stand should require bacterial testing as an indicator of potential pathogens as an way to keep rainwater systems safe and to be in-line with the US EPA (drinking water standards for various sized systems), USDA (bottle water standards), and places that permit potable rainwater systems. Table A 104.2.1 says to test for "viruses" and "protozoan cysts" but does not specify which ones. There are no water quality laboratories that offer testing for all types of viruses and protozoan cysts. General pathogen tests cover only 2 types of protozoan cysts (Giardia and Cryptosporidium) while there are tens of thousands of types of protozoa and they are found nearly everywhere on earth: Most are not harmful. According to the book, "Medical Microbiology" chapter 77 by Robert Yaeger, "Virtually all humans have protozoa living in or on their body at some time, and many persons are infected with one or more species throughout their life. Some species are considered commensals, i.e., normally not harmful, whereas others are pathogens and usually produce disease." According to the Center for Disease Control, "Nonpathogenic intestinal protozoa are single-celled parasites commonly found in the intestinal tract but never associated with illness. They do not harm the body, even in people with weak immune systems. Symptomatic people who are found to have these protozoa in their stool should be examined for other causes of their symptoms. The nonpathogenic intestinal protozoa include: Chilomastix mesnili, Endolimax nana, Entamoeba coli, Entamoeba dispar, Entamoeba hartmanni, Entamoeba polecki, Iodamoeba buetschlii.

	(https://www.cdc.gov/parasites/nonpathprotozoa/index.html) As you can see, not only would it be impossible to test for all protozoans that create cysts, it would not be useful information because there are many types that are not harmful to humans. That said, there are a number of protozoan pathogens that are human parasites, causing diseases such as malaria (by Plasmodium), amoebiasis, giardiasis, toxoplasmosis, cryptosporidiosis, trichomoniasis, Chagas disease, leishmaniasis, African trypanosomiasis (sleeping sickness), amoebic dysentery, acanthamoeba keratitis, and primary amoebic meningoencephalitis (naegleriasis). Is the table meaning to test for all these? Clearly it would not be logical to test for pathogens that are not found in most places, such as African trypanosomiasis which is only found in Subsaharan Africa. So what protozoan cysts does the table intend for people to test for? What about the potential to test for viruses? There are literally millions of types of viruses. Viruses are found everywhere on Earth. Last year scientists published a paper in the International Society of Microbial Ecology Journal and reported that 800 million viruses, mainly of marine origin, are deposited daily from the Earth's atmosphere onto every square meter of the planet's surface. There is literally a global atmospheric stream distributing viruses around the planet. Should we be testing for all these? https://www.nytimes.com/2018/04/13/science/virosphere-evolution.html And not all viruses are harmful, in fact, most aren't. According to Dr. Suttle, author of the report, "Mostly thought of as infectious agents, viruses are much more than that. It's hard to overstate the central role that viruses play in the world: They're essential to everything from our immune system to our gut microbiome, to the ecosystems on land and sea, to climate regulation and the evolution of all species." "Viruses aren't our enemies," Dr. Suttle said. "Certain nasty viruses can make you sick, but it's important to recognize that viruses and other microbes out there are absolutely integral for the ecosystem." We clearly can not be testing for the millions of viruses falling on the earth every moment, but should we be testing for specific disease causing viruses? Many viruses infect humans, such as smallpox, rabies, the common cold, influenza, chickenpox, and cold sores. Many serious diseases such as Ebola virus disease, AIDS, avian influenza, and SARS are caused by viruses. Should we be testing for the Ebola virus in a rainwater system? Viruses are spread in different ways. Influenza viruses are spread by coughing and sneezing. Norovirus and rotavirus, are transmitted by the faecal-oral route and are passed from person to person by contact, entering the body in food or water. HIV is one virus transmitted through sexual contact and by exposure to infected blood. Should we be testing for only viruses that are pathogens to humans and passed through water? Or are we worried about influenza, chickenbox, and HIV viruses on the roof of a house getting into a rainwater system? Table A 104.2.1 does not specify. A few water quality laboratories offer tests for some general types of viruses. The "Total Culturable Viruses" tests for enteric viruses only and the "Total Culturable Viruses and Molecular Analysis" tests for Enteric viruses, Enteroviruses and Noroviruses. These are just a minute fraction of the potential viruses that could be found in water. Is this what the table intends us to test for? What entities actually tests for viruses in drinking water, as opposed to testing for indicator organisms? States and counties that permit potable rainwater systems like San Juan County in Washington and Oregon do not require virus testing. (They require bacterial indicator organism testing, which if found, signifies that viruses could be present.) The US EPA recommends bacterial indicator organisms to be tested for potential microbial contamination of drinking water. They specifically require public water systems to test for total coliforms and to follow up any positive tests with an e.coli test. (Total coliform come from many sources and are typically not harmful, but indicate potential contamination, hence the requirement for e. coli test which shows if there is fecal contamination which would indicate potential pathogens.) Two types of protozoan cysts are required to be tested for in public water systems supplying to over 10,000 people by the EPA: giardia and cryptosporidium. Public water systems supplying water to over 100,000 people must also test for total culturable viruses (which only represent a minute fraction of potential viruses in the water). There are no testing requirements for private water systems serving less than 15 service connections. To keep potable rainwater systems safe we need logical, science-based, attainable testing requirements of indicator organisms (total coliforms followed with e.

	coli) as well as to require a treatment train of filters and disinfection that would nullify any potential pathogen in the system. (On-line source for EPA requirements for virus testing found here and uploaded: https://eal-labs.com/enteric-viruses-epa600r-95178-s-viii-reference/) On-line Sources: Bottled water testing: https://www.fda.gov/food/foodscienceresearch/laboratorymethods/ucm064948.htm#water EPA recommendations for using coliform for drinking water: https://www.epa.gov/dwreginfo/revised-total-coliform-rule-and-total-coliform-rule The Environmental Protection Agency (EPA) published the Revised Total Coliform Rule (RTCR) in the Federal Register (FR) on February 13, 2013 (78 FR 10269) and minor corrections on February 26, 2014 (79 FR 10665). The RTCR revises the 1989 Total Coliform Rule (TCR) and is intended to improve public health protection. Find EPA rule here: https://www.govinfo.gov/content/pkg/FR-2013-02-13/pdf/2012-31205.pdf
Referenced Standards:	

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	A 104.3.3
Proposed Text:	**A 104.3.3. Filtration and Disinfection Systems.** Filtration and disinfection systems shall be located after the water storage tank. Where a chlorination system is installed, it shall be installed upstream of filtration systems. Where ultraviolet disinfection system is installed, a minimum of 2 inline filters, one 5 micron (5 µm) filter followed by one 0.5-1 micron (0.5-1 µm) filter, shall be installed prior to the disinfection system. ~~filter not greater than 5 microns (5 µm) shall be installed upstream of the disinfection system.~~
Problem Statement:	Current literature on potable rainwater systems recommends two filters prior to a UV system to prevent the potential shading of a pathogen from the UV light. This will ensure the UV disinfection system renders all potential pathogens harmless. (Sources: Rainwater Harvesting: System Planning Manual by Texas A&M and ARCSA, and the book, Design for Water by Heather Kinkade-Levario)
Referenced Standards:	

Name:	Pat Lando
Organization:	Recode
Representing:	Chairman for WE-Stand NonTraditional Toilets Task Group
Recommendation:	Add text
Section Number:	Appendix D
Proposed Text:	**Appendix D** **Composting Toilet and Urine Diversion Inspection Checklist** **D 101.0 General.** **D 101.1 Applicability.** This appendix provides an inspection checklist for composting toilet and urine diversion systems designed in accordance with Section 403.2.2. This is only a general checklist and is not intended to address all the provisions required by Section 403.2.2. **D 201.0 Composting Toilet and Urine Diversion Inspection Checklist.** This section includes the inspection checklist form. **System Materials and Components** ☐ Verify that the system is approved by the AHJ as indicated in the approved design. ☐ All components expected to contact excreta or leachate shall be constructed of corrosion resistant material such as stainless steel or durable polymers (ABS, PVC Schedule 40, Polypropylene, High-density polyethylene, Fiber-reinforced polyester, or material of equivalent durability). **Concrete Construction** ☐ Verify site built concrete mix, loading weight. ☐ Site built concrete construction shall be reinforced and without cracking, spaulding or other observed faults. ☐ Verify site built concrete watertightness ☐ Verify site built concrete adequate drainage where required; Floors of processors shall be sloped not less than ¼-inch per foot. Note; The flange of each sub-drain shall be set level. **Commode** ☐ If commode uses repurposed container for transporting excreta into compost processor, container meets third part listing by a listing agency, including US 49 CFR Section 178.274 Specifications for UN Portable Tanks. **Compost Processors** ☐ Compost processors shall have a leachate collection, recirculation, evaporation, or drainage system. See also Leachate Storage Tank checklist. ☐ Compost processor is rodent proof. No unsecured opening other than vents, drainage, or commode may exceed ½-inch in the least dimension. ☐ All composting processors shall be labeled and protected from human contact, surface water and precipitation. ☐ Compost processor must pass a water tightness test by filling the system to the maximum designed liquid storage capacity of the unit for a duration of 24 hours. ☐ Where unprocessed excreta or diverted urine is transferred from commode to processor(s), provide tools and cleaning materials as described in the owner's manual.

☐ Commodes connected to compost processor without a trap shall maintain negative ventilation. If compost processor is not connected to the commode no vent is required
☐ Vent stacks terminate at exterior of the building as required by the plumbing or mechanical code.
☐ The compost processor is sized in accordance with the approved design.

Leachate Storage Tanks

☐ Leachate storage tanks, where provided, shall be constructed of polyethylene terephthalate (PET), polyethylene napthalate (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.
☐ 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.
☐ Where openings are provided to allow a person to enter the tank, the opening is marked "DANGER-CONFINED SPACE."
☐ All openings are covered and secured to prevent tampering. Openings shall be screened or covered to prevent rodent infiltration and be protected against unauthorized human entry.
☐ Below grade storage tanks shall be in accordance with the approved design.
☐ If pressure equalization vents are specified in the design, they are installed as designed.
☐ 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
☐ Where storage tank overflows are installed they shall be connected to the plumbing drainage system.
☐ All leachate storage tanks shall have a high-water alarm. The alarm shall report when 80 percent volume is reached.
☐ Storage tank overflows shall be provided with a backwater valve or check valve at the point of connection to the plumbing drainage system when connected to a public sewer system. The backwater valve shall be accessible for inspections and maintenance.

Urine Storage Tanks

☐ Below grade urine storage tanks shall be in accordance with the approved design.
☐ Above grade storage urine storage tanks are constructed of polyethylene terephthalate (PET), polyethylene napthalate (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.
☐ Above grade storage tanks are prohibited where subject to freezing conditions or shall be provided with an adequate means of freeze protection.
☐ If a vent is required for pressure equalization, then the vent shall extend above 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.
☐ Vent terminal is directed downward and covered with a 3/32-inch mesh screen to prevent the entry of vermin and insects.
☐ Pressure equalization vents that prevent nitrogen loss by the use of restrictions or use 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.
☐ If storage tank overflows are installed they shall be connected to a plumbing drainage system.

☐ Storage tank overflows have a backwater valve or check valve at the point of connection to the plumbing drainage system when connected to a public sewer system.
☐ The backwater valve is accessible for inspections and maintenance.
☐ Storage tank trap is a P-trap, mechanical trap, submerged inlet piping, or other means approved by the Authority Having Jurisdiction. Urine storage tanks of five gallons or less connected to fixtures with active ventilation or having an integrated seal do not require traps.
☐ If submerged inlet piping is used as trap, the inlet piping must remain submerged during use and after pumpout.

Urine Diversion System
☐ Material used for urine diversion shall be stainless steel or non-metallic pipe. Concrete piping is prohibited.
☐ Urine diversion piping is identifiable and labeled. Pipe diameters are sized in accordance with AHJ and the plumbing code.
☐ Where unprocessed urine is transferred from commode to processor(s), provide tools and cleaning materials as described in the owner's manual.
☐ Changes in direction of urine diversion piping shall be made by a long-sweep 90-degree fitting or other approved fittings of equivalent sweep.
☐ Fixtures discharging into urine diversion piping connected to the plumbing drainage system shall be trapped and vented according to the plumbing code.
☐ Urine diversion piping is installed at a minimum grade of ½- inch per foot, or 4 percent toward the point of disposal.
☐ Urine is diverted to a storage tank or an approved plumbing drainage system.
☐ A maintenance plan shall be included per the design system

Cleanouts
☐ Cleanouts installed at each aggregate horizontal change of direction exceeding 135 degrees.
☐ A cleanout provided at the upper terminal of each drain line every 50 feet.

Venting
☐ Commode fixtures connected directly to compost processor(s) without traps require a ventilation system.
☐ Nonwater urinals used as urine diversion systems shall be connected to a dry toilet ventilation stack or a urine diversion ventilation stack.

Operation & Maintenance Manual: An owner's manual is on site and accessible to the inspector and includes the following:

Product information
- ☐ Model/Serial number
- ☐ Product certification references
- ☐ Intended treatment capacity with regard to number of users and uses per day
- ☐ Initial setup

Start up and operation
- ☐ Schedule for addition of necessary compost additives.
- ☐ Source or provider of necessary compost additives. Source may be on-site.
- ☐ Schedule and instructions for all regular maintenance tasks.
- ☐ Expected input of and capacity for excreta and compost additives to compost toilet system specifying loading of commode(s) and compost processor(s).

Annual Maintenance
- ☐ Plan for container transfer and cleaning where transfer is used.

	☐ Expected schedule for removing humus from composting processors and where used secondary composting bins. ☐ Plan for on-site disposal of humus or professional removal. ☐ Plan for managing leachate. ☐ Special conditions; cold climate operation and/or winterization **Testing** ☐ Plan for microbial testing. ☐ Humus Sampling ☐ A laboratory is under contract to perform testing of finished compost. ☐ A sample of the previous treatment period shall be on-hand with fecal coliform/gram results. **Troubleshooting** ☐ Guide to troubleshooting basic operating functions
Problem Statement:	Appendix D "Composting Toilet and Urine Diversion Inspection Checklist" is intended to provide a practical, in the field check list for approving officials to follow. The list is provided to assist the inspector in verifying the components, its operations and maintenance procedures, follow the approved design.
Referenced Standards:	