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IV. Direct Potable Water Use Task Group Report

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VI. Water Efficient Landscaping Task Group Report
AGENDA

2023 Water Efficiency & Sanitation Standard
Technical Committee Meeting
IAPMO World Headquarters, Ontario, CA
May 17, 2023 – May 18, 2023

I. Call to Order
II. Chairman Comments
III. Announcements
IV. Self-Introductions
V. Review and Approval of Agenda
VI. Approval of Minutes from Previous Meeting (June 22 & June 23, 2022 – Ontario, CA)
VII. Report of the Direct Potable Water Use Task Group (Chair)
VIII. Report of the Premise Water Supply System Design Task Group (Chair)
IX. Report of the Water Efficient Landscaping Task Group (Staff Liaison)
X. Discussion on Public Comments to the Water Efficiency and Sanitation Standard
XI. Other Business
XII. Future Meetings
XIII. Adjournment
TENTATIVE ORDER OF DISCUSSION
2023 PROPOSED PUBLIC COMMENTS TO THE
WATER EFFICIENCY AND SANITATION STANDARD

The following is the tentative order of discussion in which the public comments will be discussed at the Technical Committee Meeting. Proposed public comments that are grouped together are those that are both indented and separated by lines. Indented public comments are those being discussed out of numerical order.

Item # 008
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Water Efficiency and Sanitation Standard Public Comments
Proposals

Item #: 008
WESand 2023  Section: 106.1

SUBMITTER: Jim Majerowicz
Plumbers Local Union 130 U.A.

RECOMMENDATION:
Revise text

106.0 Connection Approval.
106.1 Connections. No person shall make connection to any plumbing system regulated by this standard for which a permit is required unless approved by the Authority Having Jurisdiction. No person shall make the connection from a water-supply line nor shall connect to a sewer system regulated by this standard and for which a permit is required until approved by the Authority Having Jurisdiction.

SUBSTANTIATION:
The proposed modification is needed to protect the water supply line as well as the sewer system. Requiring approval by the AHJ before connection strengthens the provisions of Section 106.1 (Connections) and correlates with the plumbing code.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
Since the plumbing system includes both the supply and sewer lines, the proposed new language is redundant. The Technical Committee believes the existing language sufficiently addresses such connections.

TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS:  AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WESand  Section #: 107.1  
SUBMITTER: Jim Majerowicz
Plumbers Local Union 130 U.A.

RECOMMENDATION:
Accept as Submitted

Request to replace the code change proposal by this public comment.

107.0 Connection Approval.
107.1 Connections. No person shall make connection to any plumbing system regulated by this standard for which a permit is required unless approved by the Authority Having Jurisdiction. The Authority Having Jurisdiction shall be permitted to authorize temporary connection to plumbing equipment for the purpose of testing equipment.
SUBSTANTIATION:
The plumbing code makes this same statement for temporary connections, and it would be beneficial to give the Authority Having Jurisdiction the same permission in the WESstand. Throughout this standard there are various systems that require connection to the plumbing system, and temporary access when testing these systems is essential.
Item #: 016
WEStand 2023 Section: Chapter 2, Chapter 5, Appendix D

SUBMITTER: Markus Lenger
Chair, WE-Stand Urine Diversion Systems & Treatment Task Group

RECOMMENDATION:
Revise text

205.0 - C -
**Commode.** The composting toilet fixture for collecting, containing, or transporting excreta to the compost processor.

205.0 - C -
**Compost Additives.** Any material such as sawdust, wood shavings, and other compostable material added to the **commode dry toilet** or compost processor to maintain operational conditions within the composting toilet system.

206.0 - D -
**Dry Toilet.** A fixture for collecting, containing, or transporting excreta, without the use of water. (Also known as **commode or site-built toilet.**)

222.0 - T -
**Transfer.** The controlled transfer of excreta or partially processed humus between **commode dry toilet** and composting processor or between multi-stage composting processors.

223.0 - U -
**Urine Diversion.** Separation of urine from other excreta that occurs at the **commode-dry toilet**.

504.0 Maintenance and Inspection.

504.2 Operation and Maintenance Manual. An owner’s manual shall present clear instructions for maintenance and be transferred to the new owner upon transfer of property or tenancy. The owner’s manual shall include:
(1) – (3) (remaining text unchanged)
(4) Expected input of and capacity for excreta and compost additives to compost toilet system specifying loading of **commode(s) dry toilet(s)** and compost processor(s).
(5) – (9) (remaining text unchanged)

505.0 Composting Toilet System Design.

505.4 **Commodes Dry Toilets.**
505.4.1 Odor. **Commode Dry toilet** design or use shall mitigate the infiltration of odors into the building during normal operation and in the event of temporary power failure.
505.4.2 Contact. **Commodes Dry toilets** shall transport excreta into the compost processor or contain excreta for transfer as designed according to the owner’s manual.
505.4.3 Vectors. **Commodes Dry toilets** shall limit vectors and prevent human contact except for regular maintenance as designed according to the owner’s manual.

505.5 **Compost Processors.** (remaining text unchanged)
505.5.3 Transfer. Where unfinished excreta or diverted urine is transferred between processors or from **commode dry toilet** to processor, transfer and cleaning of containers and provisions for limiting user exposure shall be according to the owner’s manual.
505.5.5 Vermin (Rodent) Proofing. The compost processor shall be protected to prevent the entrance of rodents, vermin, and insects. No unsecured opening other than vents, drainage, or compost dry toilet may exceed ½-inch (12 mm) in the least dimension.

505.5.8 Ventilation. Negative ventilation between the compost dry toilet and compost processor shall be provided when the compost processor is connected directly to the compost dry toilet without a trap. Compost dry toilets that are not connected to the compost processor do not require a vent.

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

APPENDIX D

COMPOSTING TOILET AND URINE DIVERSION INSPECTION CHECKLIST

D 201.0 Composting Toilet and Urine Diversion Inspection Checklist. This section includes the inspection checklist form.

Commode Dry Toilet

☐ If compost dry toilet uses repurposed container for transporting excreta into compost processor, container meets third party 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 compost dry toilet 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 compost dry toilet to processor(s), provide tools and cleaning materials as described in the owner's manual.

☐ Composes Dry toilets connected to compost processor without a trap shall maintain negative ventilation. If compost processor is not connected to the compost dry toilet 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.

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 compost dry toilet 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.
Venting

☐ Commode Dry toilet 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.

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) dry toilet(s) and compost processor(s).

(PORTION OF CHECKLIST NOT SHOWN REMAINS UNCHANGED)

SUBSTANTIATION:
The definition for “commode” is a vernacular word that typically describes a fixture in a pit toileting system. Compost toileting systems may use many different types of fixtures that use “toilet” as the basis of its nomenclature. To align with this, “commode” should be replaced with “dry toilet” throughout the WE•Stand. Following the appropriate nomenclature, “toilet,” more accurately describes the fixtures that operate without water in compost toileting systems. For these reasons, the proposed modifications are necessary and improve the WE•Stand.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as there are commodes which are not entirely “dry.” The term “commode” is therefore needed for the enforcement of such installations regarding the limitations of the provisions being applied to other types of applicable toilets.

Additionally, the phrase “transporting excreta” in the provided definition may cause confusion. The Technical Committee recommends the Urine Diversion Systems & Treatment Task Group make the necessary revisions via public comment.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 27 NEGATIVE: 1 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF NEGATIVE:

LANDO: The “commode” is a colloquial term for the component in a composting/pit toilet system that a person sits on. It typically does not use water. *A commode may or may not be a part of a urine reuse system.

Definitions that are in succession with the plumbing code are:
Toilet
- as approved proposal #016 Dry Toilet
- as approved proposal #078 Urine Diverting Dry Toilet
- as approved proposal #078 Urine Diverting Toilet
*A commode that uses water would be defined as toilet.

Appended Comments
PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: Chapter 2, Chapter 5, Appendix D  Item #: 016

SUBMITTER: Pat Lando  Recode  Comment #: 1

RECOMMENDATION: Accept as Modified

Request to replace the code change proposal by this public comment.

205.0 - C - Commode. The composting toilet fixture for collecting, containing, or transporting excreta to the compost processor. Compost Additives. Any material such as sawdust, wood shavings, and other compostable material added to the commode dry toilet or compost processor to maintain operational conditions within the composting toilet system.

206.0 - D - Dry Toilet. A fixture for collecting, containing, or transporting excreta without the use of water to move contents to the compost processor. (Also known as commode, site-built toilet, or foam flush toilet.)

215.0 - M - Micro-Flush Toilet. A fixture for collecting, containing, or transporting excreta that uses 500 ml of water or less per flush to move contents to the compost processor.

222.0 - T - Transfer. The controlled transfer of excreta or partially processed humus between commode dry toilet and composting processor or between multi-stage composting processors.

223.0 - U - Urine Diversion. Separation of urine from other excreta that occurs at the commode dry toilet.

224.0 - V - Vacuum Flush Toilet. A fixture for collecting, containing, or transporting excreta that utilizes a suction to move the contents to the compost processor.

504.0 Maintenance and Inspection.

504.2 Composting Toilet; Operation and Maintenance Manual. An owner’s manual shall present clear instructions for maintenance and be transferred to the new owner upon transfer of property or tenancy. The owner’s manual shall include:

(1) – (3) (remaining text unchanged)

(4) Expected input of and capacity for excreta and compost additives to compost toilet system specifying loading of commode dry toilet(s) and compost processor(s).

(5) – (9) (remaining text unchanged)

505.0 Composting Toilet System Design.

505.4 Commodes Dry Toilets. Commodes dry toilets shall comply with Section 505.4.1 through Section 505.4.3.

505.4.1 Odor. Commodes dry toilet design or use shall mitigate the infiltration of odors into the building during normal operation and in the event of temporary power failure.

505.4.2 Contact. Commodes dry toilets shall transport excreta into the compost processor or contain excreta for transfer as designed according to the owner’s manual.

505.4.3 Vectors. Commodes dry toilets shall limit vectors and prevent human contact except for regular maintenance as designed according to the owner’s manual.
505.5 Compost Processors. (remaining text unchanged)

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

505.5.5 Vermin (Rodent) Proofing. The compost processor shall be protected to prevent the entrance of rodents, vermin, and insects. No unsecured opening other than vents, drainage, or commode dry toilet may exceed ½-inch (12 mm) in the least dimension.

505.5.8 Ventilation. Negative ventilation between the commode dry toilet and compost processor shall be provided when the compost processor is connected directly to the commode dry toilet without a trap. Compost processors that are not connected to the compost processor do not require a vent.

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

APPENDIX D

COMPOSTING TOILET AND URINE DIVERSION INSPECTION CHECKLIST

D 201.0 Composting Toilet and Urine Diversion Inspection Checklist. This section includes the inspection checklist form.

Commode Dry Toilet
- If commode dry toilet 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 dry toilet 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 dry toilet to processor(s), provide tools and cleaning materials as described in the owner's manual.
- Compost toilets connected to compost processor without a trap shall maintain negative ventilation. If compost processor is not connected to the commode dry toilet 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.

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 Authority Having Jurisdiction and the plumbing code.
- Where unprocessed urine is transferred from commode dry toilet 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 gradient 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.

Venting
- Commode Dry toilet 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.
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) dry toilet(s) and compost processor(s).

(portion of checklist not shown remains unchanged)

(below shown for information purposes only)

223.0  --U--
Urine Diverting Dry Toilet (UDDT). A fixture for collecting, containing, or transporting urine and feces separately without the use of water through independent piping.
Urine Diverting Toilet. A fixture for collecting, containing, or transporting urine and feces separately through independent piping.

502.0 Design and Construction.

502.1 Requirements. Composting toilets, composting toilet systems, and urine diversion systems shall meet the design, construction, and performance requirements of Section 502.1.1 or Section 502.1.2.

502.1.1 Composting Toilets and Composting Toilet Systems. Composting toilets and composting toilet systems shall be listed to NSF 41 or approved by the Authority Having Jurisdiction.

502.1.2 Alternative Design Systems. Where approved by the Authority Having Jurisdiction, composting toilets, urine diverting toilets, urine diverting dry toilets (UDDTs), and urine diversion systems for residential and commercial applications shall comply with the provisions of Section 502.2 through Section 506.1.

SUBSTANTIATION:
Language has been edited to provide an updated and coordinated definition for “dry toilet” within the WE-Stand. Additionally, this public comment replaces the term “commode” with “dry toilet” in all new locations where the term “commode” was inserted as a result of Technical Committee actions on proposals.

It is worth noting that the proposal for Item #078 was “accepted as submitted,” and includes provisional language as well as definitions for “urine diverting dry toilet” and “urine diverting toilet.” (See Section 223.0 and Section 502.0 - Section 502.1.2 above.)

The alternative name, “foam flush,” into the definition of “dry toilet” further clarifies that these fixtures are dry toilets since they do not use water to move contents out of the fixture and to the compost processor. The foam application varies from fixture to fixture and can be engaged under a ‘flush,’ timed or continuous basis. The foam, a water-based surfactant, cleans and provides a slippery surface to the fixture and doesn’t actually move, ‘flush’ or push the excreta to the composter. The foam flush toilet units are typically rated as a maximum of 6 oz. of water ‘per use.’

The terms “micro-flush” and “vacuum flush” toilets are not currently used in the UPC or WEStand; however, they are found in ecosanitation systems, and I would suggest that these terms are defined to provide additional guidance for fixtures that fall under the category of ecosanitation.
Proposals

Item #: 020
WEStand 2023  Section: 207.0

SUBMITTER: John S Lansing
PAE Consulting Engineers

RECOMMENDATION:
Add new text

207.0 - E -
Effluent. Treated or untreated wastewater typically discharged into surface waters from sewers, treatment plants, or industrial facilities.

SUBSTANTIATION:
The term “effluent” is used throughout Chapter 4, Chapter 7, and Chapter 8 without any current terminology provided in Chapter 2. Without clarification, it may be unclear to the end user as to the type of wastewater these provisions apply to. More specifically, there are water quality requirements that must be followed based on wastewater reuse for water closets and urinal fixtures. The proposed definition also aligns with the US EPA.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The provided terminology does not align with the intent of the language used in the WE•Stand which indicates that effluent is treated water.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 22  NEGATIVE: 6  NOT RETURNED: 2  CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:

BARNES: I agree with the comment left by the American Supply Association (Jim Kendzel).

KENDZEL: There is a need for a definition for the term "effluent." However, the motion to reject approved by the Committee is appropriate. Proponent or a Committee member could submit a definition that is consistent with the use of the term in the standard.

EXPLANATION OF NEGATIVE:

KLEIN: Effluent needs to be clearly defined in WE•Stand since it is used many times, and in somewhat different contexts. The TC should establish a working group to review the uses of the word and make sure that the rules for an effluent discharge are clearly distinguished from an effluent that, after treatment, becomes a new water source.

KOELLER: If "effluent" is used repeatedly in the document, it should be defined.

LANSING: Adding a definition for "effluent" is useful for further strengthening the WE•Stand document.

LENGER: There is a need to define effluent.
PREMER: "Effluent" needs to be defined in the WE•Stand.

TABAKH: I agree with the other comments provided.

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 207.0  Item #: 020
SUBMITTER: Chelsea Salaiz  Self
Comment #: 1

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

207.0 - E -
Effluent. Treated wastewater discharged from an onsite wastewater treatment system. Such wastewater may contain various pollutants depending on the level of treatment and type of source water.

SUBSTANTIATION:
As it pertains to the WEStand, “effluent” primarily refers to treated water that is discharged from an onsite wastewater treatment system. More specifically, the term "effluent" is only used within Chapter 7 (Onsite Blackwater Treatment Systems) and Chapter 8 (Onsite Stormwater Treatment Systems). In this standard, effluent from an onsite blackwater or stormwater treatment system is required to meet specific log reduction targets and minimum water quality dependent on intended application or use. The second sentence of the provided definition addresses this potential variation in water quality and allows for applicability to each onsite treatment system mentioned within the WEStand.
Proposals

Item #: 021
WEStand 2023  Section: 209.0

SUBMITTER: Jazmin Curiel
Self

RECOMMENDATION:
Add new text

209.0 - G -
Grade. The slope or fall of a line of pipe in reference to a horizontal plane. In drainage, it is usually expressed as the fall in a fraction of an inch (in) (mm) or percentage slope per foot (ft) (m) length of pipe.

SUBSTANTIATION:
The term "grade" is used throughout the WE•Stand for provisions pertaining to the installation of storage tanks and horizontal piping. The provided definition is clear and correlates with the plumbing code. Additionally, such language assists users of the standard and provides additional information needed for applying provisions.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed definition is correct for plumbing applications but is incorrect as used within the WE•Stand. This adds confusion as to what "grade" vs. "slope" is considered within this document. The term "grade" throughout the WE•Stand provisions is not related to slope, and where grade is specified a slope is provided. In order to mitigate this issue, the Technical Committee recommends that a public comment be submitted which provides this distinction.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:
LANDO: The term "grade" throughout the WE•Stand provisions is not related to slope but to the land. To mitigate this confusion, a public comment should be submitted which provides this distinction.

Appended Comments

PUBLIC COMMENT 1
Code Year: 2023 WEStand  Section #: 209.0, B 101.1
SUBMITTER: Jim Majerowicz
Plumbers Local Union 130 U.A.
RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

209.0    - G -
Grade. A reference plane representing the average of finished ground level.

B 101.0 Vacuum Drainage Systems.
B 101.1 General. This section regulates the design and installation provisions for vacuum waste drainage systems. Plans for vacuum waste drainage systems shall be submitted to the Authority Having Jurisdiction for approval and shall be considered an engineered designed system. Such plans shall be prepared by a registered design professional to perform plumbing design work. Details are necessary to ensure compliance with the requirements of this section, together with a full description of the complete installation including quality, grade of materials classification, equipment, construction, and methods of assembly and installation. Components, materials, and equipment shall comply with Section 302.1 or approved by the Authority Having Jurisdiction and other national consensus standards applicable to plumbing systems and materials. Where such standards and specifications are not available, alternate materials and equipment shall be approved in accordance with Section 301.2.

SUBSTANTIATION:
During the last Technical Committee meeting, Item #085 was amended to replace the word “grade” with “gradient” whenever the requirements pertained to slope. In support of this change, a definition for “grade” is being proposed. Upon review of the WEStand, the term “grade” in reference to ground level is used for installation of storage tanks, supply piping for subsurface irrigation fields, mulch basins, gray water supply piping, and service hot water systems. Therefore, a definition of “grade” seems fitting for the WEStand.

Section B 101.1 (General) is also being updated to replace the phrase “grade of materials” with “material classification.” This is the only other location where the term “grade” is not used as defined by this public comment. Although “grade of materials” is clearly not referring to slope or reference plan of ground level, the revision to Section B 101.1 offers consistency in the event the definition for “grade” is accepted.
Proposals

Item #: 023
WEStand 2023 Section: 209.0

SUBMITTER: Jazmin Curiel
Self

RECOMMENDATION:
Add new text

209.0 - G -
Groundwater. Water that exists beneath the earth’s surface.

SUBSTANTIATION:
Since this document addresses excavation limitations and provisions to prevent contamination of groundwater, it is appropriate to include a definition for “groundwater” in Chapter 2. Lastly, similar language was accepted by the UPC Technical Committee for Item #016.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The provided terminology is too broad and leads to misinterpretation. Additionally, this language does not provide any benefit to the WE•Stand as presented. There needs to be a distinction where groundwater is considered “water infiltrated within the soil below the earth’s surface.”

TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS: AFFIRMATIVE: 28 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:
KLEIN: The TC should find other sources that define groundwater and use them as a starting place for a definition that makes sense within the standard.
KOELLER: Not ALL water beneath the 'surface' is normally classified as 'groundwater,' e.g., is potable water inside a buried supply pipe legitimately classified as groundwater? Of course not.

Appended Comments

PUBLIC COMMENT 1
Code Year: 2023 WEStand Section #: 209.0
SUBMITTER: Jeff Persons
Self
RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

209.0 - G -
Groundwater. Water that exists in saturated zones beneath the land surface and may discharge to surface waters such as rivers, streams, lakes, ponds, and wetlands.

SUBSTANTIATION:
A more technical definition of “groundwater” would be beneficial to the WEStand. The original proposal failed to mention that groundwater is essentially in saturated zones beneath unsaturated soil, or the land surface. Including potential methods of discharge also gives needed details when understanding groundwater and its impact on the environment or its potential uses.

PUBLIC COMMENT 2

Code Year: 2023 WEStand  Section #: 209.0
SUBMITTER: Jazmin Curiel  Self

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

209.0 - G -
Groundwater. Water infiltrated within the soil below the earth’s surface.

SUBSTANTIATION:
Based on the provided committee statement and comments, the definition has been reworked to state “water infiltrated within the soil below the earth’s surface.” The definition makes clear that not all water beneath the earth's surface is classified as groundwater.
Proposals

Item #: 024
WEStand 2023  Section: 210.0

SUBMITTER: Jazmin Curiel
Self

RECOMMENDATION:
Add new text

210.0  - H -
Heat Exchanger. A device that transfers heat from one medium to another.

SUBSTANTIATION:
Heat exchangers are addressed in Chapter 10, and providing a simple definition would be beneficial to users of the WE•Stand. In particular, Chapter 10 focuses on conserving water and energy associated with the generation and use of hot water. In order to accomplish this, various requirements aligning with ASHRAE are laid out within the chapter, many of which pertain to heat exchangers. Furthermore, the provided definition is consistent with the plumbing code. For these reasons, the new language is necessary for inclusion.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The provided substantiation mentions consistency with the plumbing code. However, the definition for “heat exchanger” does not exist in the plumbing code.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS:  AFFIRMATIVE: 26  NEGATIVE: 2  NOT RETURNED: 2  CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:

KENDZEL: I support the Committee’s decision to reject; however, it seems the issue can be easily resolved in public comment by updating the substantiation to reflect text is consistent with the Mechanical Code. A definition for "heat exchanger" is needed since it is used in Chapter 10.

EXPLANATION OF NEGATIVE:

LENGER: “Heat exchanger” needs a definition.

PAPE: The definition is needed despite the flaw in the substantiation.

Appended Comments
PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 210.0  Item #: 024

SUBMITTER: Jim Majerowicz
Plumbers Local Union 130 U.A.

RECOMMENDATION:
Accept as Submitted

Request to accept the code change proposal as submitted by this public comment.

SUBSTANTIATION:
The original substantiation incorrectly referenced the plumbing code. This definition was actually derived from the USHGC. The original technical justification for this definition was otherwise accurate.
Proposals

Item #: 027
WEStand 2023  Section: 218.0

SUBMITTER: Billy Smith
Chair, WE-Stand Technical Committee

RECOMMENDATION:
Add new text

218.0 - P - Plumbing System. Includes all potable water, alternate water sources, building supply, and distribution pipes; all plumbing fixtures and traps; all drainage and vent pipes; and all building drains and building sewers, including their respective joints and connections, devices, receptors, and appurtenances within the property lines of the premises.

SUBSTANTIATION:
The proposed terminology for “plumbing system” is clear and may be valuable to users of the WE•Stand. Such language was derived from the terminology provided in the plumbing code. Additionally, many of the provisions within this standard incorporate the plumbing system and connections to it. For these reasons, the definition is beneficial.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS:  AFFIRMATIVE: 26  NEGATIVE: 2  NOT RETURNED: 2  CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:
KOELLER: I agree with the comment by Mr. Thomas Pape on this ballot. Minor editorial changes need to be made before publication.

LANDO: Agreed: "There are terms used in this definition that are already defined in Chapter 2; thus, should be italicized."

EXPLANATION OF NEGATIVE:
PAPE: There are terms used in this definition that are already defined in Chapter 2; thus, should be italicized.

PREMER: I agree with the prior comments in terms of editorial change.

Appended Comments
PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 204.0, 218.0  Item #: 027

SUBMITTER: Jim Majerowicz  Plumbers Local Union 130 U.A.  Comment #: 1

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

204.0 - B -
Building Drain. That part of the lowest piping of a drainage system that receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer beginning 2 feet (610 mm) outside the building wall.

Building Sewer. That part of the horizontal piping of a drainage system that extends from the end of the building drain and that receives the discharge of the building drain and conveys it to a public sewer, private sewer, private sewage disposal system, or another point of disposal.

218.0 - P -
Plumbing Fixture. An approved type installed receptacle, device or appliance that is supplied with water or that receives liquid or liquid-borne wastes and discharges such wastes into the drainage system to which it may be directly or indirectly connected. Industrial or commercial tanks, vats, and similar processing equipment are not plumbing fixtures, but may be connected to or discharged into approved traps or plumbing fixtures where and as otherwise provided for elsewhere in the plumbing code.

SUBSTANTIATION:
The terminology for “plumbing system” includes reference to “building drain,” “building sewer,” and “plumbing fixture,” and it may be beneficial to offer users of the WEStand with these clear definitions. This language matches the plumbing code and allows the WEStand to be more inclusive of information necessary for interpretation of requirements.

Provisions for graywater systems include reference to “building drain” and “building sewer,” and “plumbing fixture” is mentioned in numerous definitions, general regulations, water consumption and conservation requirements, and sections addressing the Water Demand Calculator.
Proposals

Item #: 028
WEStand 2023  Section: 220.0

SUBMITTER: David L. Mann
California State Pipe Trades Council (Retired)

RECOMMENDATION:
Revise text

220.0  - R -
Rainwater. Natural precipitation that lands on a man-made, impervious above ground surface and can be collected on-site for beneficial uses.

SUBSTANTIATION:
The definition for “rainwater” is being revised as not all surfaces are impervious. This change is needed as there are surfaces available for the collection of rainwater which are permeable.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS:  AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Append Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 220.0  Item #: 028

SUBMITTER: Chelsea Salaiz
Self

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

220.0  - R -
Rainwater. Natural precipitation that lands on a man-made, above ground surface and can be collected on-site for beneficial uses has not been contaminated by use.

SUBSTANTIATION:
This public comment presents a simplified definition for “rainwater.” The existing language is more of an explanation of how rainwater can be collected and used rather than a definition. As defined in the plumbing code, rainwater is “natural precipitation that has not been contaminated by use.” The same definition should be reflected in this standard as it technically accurate.
Item #: 029

WEStand 2023  Section: 220.0

SUBMITTER: Billy Smith
Chair, WE-Stand Technical Committee

RECOMMENDATION:
Add new text

220.0  - R -
Rainwater Storage Tank. The central component of the rainwater catchment system. Also known as a cistern or rain barrel.

SUBSTANTIATION:
Rainwater storage tanks are addressed in Chapter 9 (Nonpotable Rainwater Catchment Systems) and in Appendix A (Potable Rainwater Catchment Systems). In both locations, lengthy requirements are listed for construction, location, drainage, overflow, access, marking, and protection. The proposed definition for “rainwater storage tank” supports these requirements and also correlates with the plumbing code. For these reasons, the terminology is necessary for inclusion within Chapter 2 (Definitions).

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed definition is oversimplified and does not provide a valid description of a “rainwater storage tank.” The Technical Committee requests that a more detailed definition be resubmitted via public comment.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS:  AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 220.0

SUBMITTER: Jazmin Curiel
Self

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

220.0  - R -
Rainwater Storage Tank. A component of a rainwater catchment system used to store collected rainwater for future beneficial use. (Also known as a cistern or rain barrel.)
SUBSTANTIATION:
The previously proposed definition for “rainwater storage tank” only described these tanks as a “component” of the rainwater catchment system without actually describing the component or the purpose it serves. Therefore, a more detailed description has been generated which indicates that this type of tank is integral with a rainwater catchment system and is used to store collected rainwater for future beneficial use. The alternative names originally offered have been included as they are commonly used.
Item #: 030

WEStand 2023  Section: 221.0

SUBMITTER: Billy Smith
Chair, WE-Stand Technical Committee

RECOMMENDATION:
Add new text

221.0  - S -

Septic Tank. A watertight receptacle that receives the discharge of a drainage system or part thereof, designed and constructed so as to retain solids, digest organic matter through a period of detention, and allow the liquids to discharge into the soil outside of the tank through a system of open joint piping or a seepage pit.

SUBSTANTIATION:
In certain alternate water source systems, the installation of surge tanks requires that overflow be drained to the existing sewer line or septic tank. Additionally, other requirements pertaining to septic tanks that align with the plumbing code are also provided within this document. To support these provisions, the definition for “septic tank” is being proposed. Furthermore, this terminology provides clarity and correlates with the plumbing code.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as the definition for “septic tank” describes a system rather than a type of tank.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 221.0  Item #: 030

SUBMITTER: Jazmin Curiel
Self

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

221.0  - S -

Septic Tank. An underground watertight receptacle that receives discharge from a drainage system, or part thereof, and is designed and constructed to allow for anaerobic bacterial decomposition of organic matter.
SUBSTANTIATION:
Based on the provided committee statement, the definition has been reworked and now describes septic tanks as essentially underground tanks that allow for decomposition of organic matter. It is still beneficial to mention connection to the drainage system as this is the source of the organic matter.

PUBLIC COMMENT 2

Code Year: 2023 WEStand  Section #: 221.0  Item #: 030
SUBMITTER: Jazmin Curiel  Self
Comment #: 2

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

221.0  - S -
Septic Tank. A component of a septic system: an underground sedimentation tank that receives discharge from a drainage system, or part thereof, and is designed and constructed to retain solids and digest organic matter.

SUBSTANTIATION:
This definition is a variation of the other public comment I provided for Item #30. The alternative option may be clearer in that it also mentions that this is “a component of a septic system” and that it is considered a “sedimentation tank.” This additional distinction may more appropriately address these tanks without confusing them with the entire private sewage disposal system. This is necessary since the design and size of septic systems can vary widely, and conventional septic systems are comprised of the septic tank, distribution box, and drainfield. All are components of the septic system but do not independently qualify as an entire system.

PUBLIC COMMENT 3

Code Year: 2023 WEStand  Section #: 221.0  Item #: 030
SUBMITTER: Jim Majerowicz  Plumbers Local Union 130 U.A.
Comment #: 3

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as submitted by this public comment.

SUBSTANTIATION:
It is important that the description of a “septic tank” includes mention of the drainage system, purpose for its design and construction, and methods of discharge. These underground receptacles offer basic sewage treatment, and without this description, the overall understanding of septic tanks is incomplete. I am also in agreeance with correlating this definition with that of the plumbing code since septic tanks are governed by that code.
Proposals

Item #: 036
WEStand 2023  Section: 221.0

SUBMITTER: Billy Smith
Chair, WE-Stand Technical Committee

RECOMMENDATION:
Add new text

221.0 - S -
Sump. An approved tank or pit that receives sewage or liquid waste and which is located below the normal grade of the gravity system and which must be emptied by mechanical means.

SUBSTANTIATION:
An entire section of the WE•Stand is dedicated to sump pumps. Sumps are commonly used to collect leftover contaminants including rainwater, oil, sand, dirt, and wastewater. Once collected and contained, these contaminants can then be disposed of at a later time. The provided definition supports the provisions of the WE•Stand and also correlates with the plumbing code.

COMMITTEE ACTION: REJECT
COMMITTEE STATEMENT:
For the purposes of the WE•Stand, sumps receive groundwater, rainwater, stormwater, and sewage. Therefore, the provided definition does not align with the intent of provisions addressed within this standard. For this reason, the proposal is being rejected.

TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS: AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1
Code Year: 2023 WEStand  Section #: 221.0

SUBMITTER: Monte Myers
Self

RECOMMENDATION:
Accept as Submitted

Request to replace the code change proposal by this public comment.

221.0 - S -
Sump. An approved tank or pit located below the normal grade of the gravity system and receives groundwater, rainwater, stormwater, sewage, or liquid waste which must be emptied by mechanical means.
In order to align correctly with the intent of this standard, the definition for "sump" has been edited to include language which mentions groundwater, rainwater, stormwater, sewage, and liquid waste. The remainder of the terminology is fundamentally the same as the original proposal.
Proposals

Item #: 038
WEStand 2023  Section: 225.0

SUBMITTER: Thomas Pape
Chair, WE-Stand Water Efficient Landscaping Task Group

RECOMMENDATION:
Add new text

225.0 - W -

Water Feature. A landscape element supplied with water for the purposes of maintaining a pool for surface water, excluding a swimming pool or spa.

SUBSTANTIATION:
The term “water feature” is used throughout the standard and does not have an established definition within Chapter 2. For the purposes of providing users of the standard with appropriate terminology, a definition has been added. The language is clear and supports the current provisions of the WE-Stand.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The provided definition is incomplete and does not specify applicable landscape elements. Additional clarification is required to appropriately define “water feature.”

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 24  NEGATIVE: 4  NOT RETURNED: 2  CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:

LANSING: Definition excludes other types of water features, such as those that do not use pool water.

SOVOCOOL: Agree with committee’s rejection. Many water features don't utilize a pooling component. Think features that cascade down rocks, etc. Maybe try, “A landscape element supplied with water for principally ornamental purposes.”

EXPLANATION OF NEGATIVE:

KLEIN: Upon further review, I agree that the definition of water feature needs to be revised.

LENGER: "Water feature" needs a definition. I agree with Thomas Pape.

PAPE: "Water feature" needs a definition.

PREMER: “Water feature” needs a definition.

Appended Comments
PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 225.0, 410.1  Item #: 038

SUBMITTER: Thomas Pape  Chair, WE-Stand Water Efficient Landscaping Task Group

RECOMMENDATION:
Accept as Submitted

Request to replace the code change proposal by this public comment.

225.0 - W -
Water Feature. An element, built primarily for ornamental purposes, and supplied with water. Such elements may include, but are not limited to, ponds, reflection pools, streams, waterfalls, and water fountains. Water features may be installed indoors or outdoors.

410.0 Fountains and Other Water Features. 410.1 Use of Alternate Water Source for Special Water Features. Special Outdoor water features such as ponds and water fountains shall be provided with reclaimed (recycled) water, rainwater, or on-site treated nonpotable water where the source and capacity is available on the premises and approved by the Authority Having Jurisdiction.

SUBSTANTIATION:
The original Task Group proposal which defines “water feature” uses the phrase “maintaining a pool for surface water” as one of the defining characteristics of a water feature. While at one time that may have been true, for some time now, water features that do not involve surface pooling of water have existed. The proposed changes expand this definition to include the range of ornamental water elements and systems intended to be covered by the standard.

The public comment also makes clear that the definition applies to elements that are either installed inside or outside of a building. An accompanying change to Section 410.1 (Use of Alternate Water Source for Special Water Features) is then needed to clarify that only outdoor water features are required to use “reclaimed (recycled) water, rainwater, or on-site treated nonpotable water” as this is in the interests of protecting human health and safety.
Proposals

Item #: 039
WEStand 2023  Section: 301.0 - 302.2

SUBMITTER: Markus Lenger
CleanBlu Innovations Inc.

RECOMMENDATION:
Revise text

301.0 Seepe-General.
301.1 Applicability. This chapter covers the general requirements for plumbing and mechanical systems covered by this standard. Such systems shall be in accordance with the requirements of this standard, the plumbing code and the mechanical code.

302.0 Approval.
302.1 Minimum Standards. Pipe, pipe fittings, traps, fixtures, material, and devices used in a plumbing system shall be listed (third-party certified) by a listing agency (accredited conformity assessment body) as complying with the approved applicable recognized standards referenced in this standard, and shall be free from defects. Unless otherwise provided for in this standard, materials, fixtures, or devices used or entering into the construction of plumbing systems, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval prior to being installed.

301.2.1 Marking. Each length of pipe and each pipe fitting, material, and device used shall have cast, stamped, or indelibly marked on it any markings required by the applicable referenced standards and listing agency, and the manufacturer’s mark or name, which shall readily identify the manufacturer to the end user of the product. Where required by the approved standard that applies, the product shall be marked with the weight and the quality of the product. Materials and devices used or entering into the construction of a system, or parts thereof shall be marked and identified in a manner satisfactory to the Authority Having Jurisdiction. Such marking shall be done by the manufacturer. Field markings shall not be acceptable.

Exception: Markings shall not be required on nipples created from cutting and threading of approved pipe.

301.2.2 Standards. Standards listed or referred to in this chapter or other chapters cover materials that will conform to the requirements of this standard, where used in accordance with the limitations imposed in this or other chapters thereof and their listing. Where a referenced standard covers materials of various grades, weights, quality, or configurations, the portion of the listed standard that is applicable shall be used. Design and materials for special conditions or materials not provided for herein shall be permitted to be used by special permission of the Authority Having Jurisdiction after the Authority Having Jurisdiction has been satisfied as to their adequacy. A list of referenced standards that appear in specific sections of this document are referenced in Table 1201.1. Standards referenced in Table 1201.1 shall be applied as indicated in the applicable referenced section.

302.1.1-301.2.3 Plastic Pipe, Plastic Pipe Fittings, and Components. Plastic pipe, plastic pipe fittings, and components other than those for gas shall comply with NSF 14.

301.2.4 Existing Buildings. In existing buildings or premises in which system installations are to be altered, repaired, or renovated, the Authority Having Jurisdiction has discretionary powers to permit deviation from the provisions of this standard, provided that such proposal to deviate is first submitted for proper determination in order that health and safety requirements, as they pertain to the system, shall be observed.

302.2 Mechanical Systems. Mechanical equipment and appliances shall be approved by the Authority Having Jurisdiction or comply with the applicable nationally referenced standards as evidenced by the listing and label of an approved agency.

(substantiation of remaining sections)

SUBSTANTIATION:
Section 301.2.1 (Marking) is being proposed as it ensures that piping, fittings, materials and devices are marked by the applicable listing agency and readily identify the manufacturer.
Section 301.2.2 (Standards) addresses the applicability of referenced standards within the WE•Stand and possible imposed limitations. Section 301.2.4 (Existing Buildings) covers permit deviations for altered, repaired, or renovated existing properties where health and safety requirements are acceptable to the Authority Having Jurisdiction.

The proposed new language and deletion of Section 302.2 is consistent with the plumbing code. Although the WE• Stand is independent of the UPC, it is beneficial to have correlation between the two documents. For these reasons, the revisions are necessary.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as the language is redundant and unnecessary. Furthermore, Section 301.2.1 (Marking) is not practical for all pipe lengths.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 26 NEGATIVE: 2 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:

BARNES: I agree with the comment by the American Supply Association (Jim Kendzel).

KENDZEL: The substantiation statement could be improved. As an example, marking requirements are already specified in the product standards. In addition, the standard is already clear as to the use of referenced standards and the extensive text of Section 301.2.2 provides no additional value.

EXPLANATION OF NEGATIVE:

KOELLER: The committee statement for rejection is vague and grossly insufficient, which indicates (to me) that a decision was made in haste.

LENGER: I still think this is needed.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand Section #: 301.0 - 302.2 Item #: 039

SUBMITTER: Monte Myers Self Comment #: 1

RECOMMENDATION: Accept as Submitted

Request to accept the code change proposal as submitted by this public comment.

SUBSTANTIATION:
Since the provisions of Chapter 3 (General Regulations) apply to all other chapters within this document, it is pertinent that information regarding markings be included here. While Section 301.2 (Minimum Standards) requires that all pipe, pipe fittings, traps, fixtures, materials, and devices used in a plumbing system be listed (third-party certified) by a listing agency, provisions are also needed to specify marking requirements. Section 301.2.2 (Standards) is then necessary to address applicability of referenced standards, limitations, and special conditions. Furthermore, the reorganization of sections and inclusion of additional requirements is necessary for consistency between the WEStand and the Uniform Codes.
PUBLIC COMMENT 2

Code Year: 2023 WEStand  Section #: 301.0 - 302.2  Item #: 039

SUBMITTER: Jim Majerowicz  Plumbers Local Union 130 U.A.  Comment #: 2

RECOMMENDATION: Accept as Modified

Request to replace the code change proposal by this public comment.

301.0 Scope General.

301.1 Applicability. This chapter governs the general requirements for plumbing and mechanical systems covered by this standard. Such systems shall be in accordance with the requirements of this standard, the plumbing code and the mechanical code.

302.0 Approval.

302.1 Minimum Standards. Pipe, pipe fittings, traps, fixtures, material, and devices used in a plumbing system shall be listed (third-party certified) by a listing agency (accredited conformity assessment body) as complying with the approved applicable recognized standards referenced in this standard, and shall be free from defects. Unless otherwise provided for in this standard, materials, fixtures, or devices used or entering into the construction of plumbing systems, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval prior to being installed.

301.2 Standards. Standards listed or referred to in this chapter or other chapters cover materials that will conform to the requirements of this standard, where used in accordance with the limitations imposed in this or other chapters thereof and their listing. Where a referenced standard covers materials of various grades, weights, quality, or configurations, the portion of the listed standard that is applicable shall be used. Design and materials for special conditions or materials not provided for herein shall be permitted to be used by special permission of the Authority Having Jurisdiction after the Authority Having Jurisdiction has been satisfied as to their adequacy. A list of referenced standards that appear in specific sections of this document are referenced in Table 1201.1. Standards referenced in Table 1201.1 shall be applied as indicated in the applicable referenced section.

302.2 Mechanical Systems. Mechanical equipment and appliances shall be approved by the Authority Having Jurisdiction or comply with the applicable nationally referenced standards as evidenced by the listing and label of an approved agency.

(renumber remaining sections)

SUBSTANTIATION:
In response to the committee statement and comments provided for this item, Section 301.2.1 (Marking) has been removed from the recommendation. With the exception for necessary section renumbering and minor revisions to use mandatory language in Section 301.1 (Applicability), the remaining portions of this public comment do not deviate from the original proposal.
Proposals

Item #: 041
WEStand 2023  Section: 304.0 - 304.1

SUBMITTER: Markus Lenger
CleanBlu Innovations Inc.

RECOMMENDATION:
Add new text

304.0 Damage to Drainage System or Public Sewer.
304.1 Unlawful Practices. It shall be unlawful for a person to deposit, by any means whatsoever, into a plumbing fixture, floor drain, interceptor, sump, receptor, or device, which is connected to a drainage system, public sewer, private sewer, septic tank, or cesspool, any ashes; cinders; solids; rags; inflammable, poisonous, or explosive liquids or gases; oils; grease; or any other foreign object whatsoever that is capable of causing damage to the drainage system or public sewer.

(renumber remaining sections)

SUBSTANTIATION:
Section 304.0 (Damage to Drainage System or Public Sewer) is being proposed to address unlawful practices which may damage the drainage system or public sewer. Since the provisions of the WE•Stand often require connections to the drainage system, such inclusion is necessary. The proposed language is also consistent with the plumbing code.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS:  AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 218.0
SUBMITTER: Chelsea Salaiz  Self

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

218.0  - P -
Public Sewer. A common sewer directly controlled by public authority.
SUBSTANTIATION:
Section 304.1 (Unlawful Practices) includes reference to the term “public sewer,” and the term is also used in various other parts of the WEStand. I am proposing a simple definition that matches the plumbing code in efforts to make the WEStand more inclusive of information necessary for interpretation of requirements.
Proposals

Item #: 045
WEStand 2023  Section: Table 402.1, Table 1201.1

SUBMITTER: Robert Pickering
Eastern Research Group, Inc.
EPA WaterSense

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>TABLE 402.1</th>
<th>MAXIMUM FIXTURE AND FIXTURE FITTINGS FLOW RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIXTURE TYPE</td>
<td>FLOW RATE</td>
</tr>
<tr>
<td>Showerheads</td>
<td>2.0 gpm @ 80 psi</td>
</tr>
<tr>
<td>Kitchen faucets residential</td>
<td>1.8 gpm @ 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets residential</td>
<td>1.5 gpm @ 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets other than residential</td>
<td>0.5 gpm @ 60 psi</td>
</tr>
<tr>
<td>Metering faucets</td>
<td>0.25 gallons/cycle</td>
</tr>
<tr>
<td>Metering faucets for wash fountains</td>
<td>One (1) 0.25 gal per cycle fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Wash fountains</td>
<td>One (1) 2.2 gpm @ 60 psi fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Water Closets</td>
<td>1.28 gallons/flush</td>
</tr>
<tr>
<td>Urinals</td>
<td>0.5 gallons/flush</td>
</tr>
<tr>
<td>Commercial Pre-Rinse Spray Valves</td>
<td>1.3 gpm @ 60 psi</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25.4 mm, 1 gallon = 3.785 L, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa

Notes:
1 For multiple showerheads serving one shower compartment see Section 402.6.1
2 Shall also be listed to either EPA WaterSense Specification for Tank-Type Toilets or EPA WaterSense Specification for Flushometer-Valve Water Closets.
3 Shall also be listed to EPA WaterSense Specification for Flushing Urinals. Nonwater urinals shall meet the specifications listed in Section 402.3.1.
4 See Section 402.4.
5 Shall also be listed to EPA WaterSense Specification for Showerheads.
6 Shall also be listed to EPA WaterSense High-Efficiency Lavatory Faucet Specification.

<table>
<thead>
<tr>
<th>TABLE 1201.1</th>
<th>REFERENCED STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD NUMBER-YEAR</td>
<td>STANDARD TITLE</td>
</tr>
<tr>
<td>EPA WaterSense-2007</td>
<td>High-Efficiency Lavatory Faucet Specification, Version 1.0</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)
Note: The EPA WaterSense Specifications meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

(shown for information purposes only)

402.2.1 Gravity, Pressure Assisted and Electro-Hydraulic Tank Type Water Closets. Gravity, pressure assisted, and electro-hydraulic tank type water closets shall have a maximum effective flush volume of not more than 1.28 gallons (4.8 Lpf) of water per flush in accordance with ASME A112.19.2/CSA B45.1 or ASME A112.19.14 and shall also be listed to the EPA WaterSense Specification for Tank-Type Toilets. The effective flush volume for dual-flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

402.2.2 Flushometer-Valve Activated Water Closets. Flushometer-valve activated water closets shall have a maximum flush volume of not more than 1.28 gallons (4.8 L) of water per flush in accordance with ASME A112.19.2/CSA B45.1 and shall be listed to the EPA WaterSense Specification for Flushometer-Valve Water Closets.

402.5.1 Lavatory Faucets in Residences, Apartments, and Private Bathrooms in Lodging Facilities, Hospitals, and Patient Care Facilities. The flow rate for lavatory faucets installed in residences, apartments, and private bathrooms in lodging, hospitals, and patient care facilities (including skilled nursing and long-term care facilities) shall not exceed 1.5 gpm (5.7 L/m) at 60 psi (414 kPa) in accordance with ASME A112.18.1/CSA B125.1 and shall be listed to the U.S. EPA WaterSense High-Efficiency Lavatory Faucet Specification.

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

SUBSTANTIATION:
Footnote 2 is being updated to align with different requirements for gravity versus flushometer-valve activated water closets, as described in Section 402.2.1 and Section 402.2.2. Footnote 5 aligns with requirements specified within Section 402.6, and Footnote 6 aligns with Section 402.5.1. Both are consistent with the other footnotes which currently exist for Table 402.1. Additionally, Table 1201.1 is being updated to remove the version number for the specification shown. This revision is consistent with the list of EPA Specifications within Table 1201.1 which do not include the version number. As new versions are published over time, it is better suited to include the publication year.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The notes accompanying Table 402.1 include requirements which are already addressed in other sections of the WE•Stand. There is concern that updates to those sections may not be carried over to the notes of Table 402.1 in future editions of the standard. As a means to prevent future conflict and to avoid repeated provisions, the proposal is being rejected.

TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS: AFFIRMATIVE: 20 NEGATIVE: 7 ABSTAIN: 1 NOT RETURNED: 2 CR AWFORD, WILLIAMS
EXPLANATION OF NEGATIVE:

CU DAHY: I concur with John Koeller.

KLEIN: I concur with John Koeller. I would also suggest that to remedy the situation the TC should ask the IAPMO secretariat for WE•Stand prepare a note for the next TC to remind them to look at all sections that refer to Water Sense to ensure that the clauses in WE•Stand are up-to-date.

KOELLER: Proposal to clarify and update WaterSense specifications and applications is essential to the effectiveness of WE•Stand. The rejection by the committee over a footnote was unwarranted.

LAN SING: I concur with John Koeller.

LEN G E R: I concur with John Koeller.
PREMER: I am in agreement with Mr. John Koeller.

TABAKH: I concur with John Koeller’s comments.

EXPLANATION OF ABSTAIN:

MCLEOD: We support the intent to update the references to include WaterSense. Regarding the details of the footnote, perhaps as Gary Klein has suggested, this is better suited for discussion with the Secretariat.

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PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 402.1 - 402.13, Table 402.1, Table 402.11

SUBMITTER: Monte Myers
Self

RECOMMENDATION:
Accept as Modified

Request to **replace** the code change proposal by this public comment.

402.0 Water-Conserving Plumbing Fixtures and Fittings.

402.1 General. The maximum water consumption of fixtures and fixture fittings shall comply with the flow rates specified in Table 402.1 and Section 402.2 through Section 402.10.

<table>
<thead>
<tr>
<th>TABLE 402.1 MAXIMUM FLOW RATES FOR FIXTURE AND FIXTURE FITTINGS FLOW RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIXTURE TYPE</td>
</tr>
<tr>
<td>Showerheads</td>
</tr>
<tr>
<td>Kitchen faucets residential</td>
</tr>
<tr>
<td>Lavatory faucets residential</td>
</tr>
<tr>
<td>Lavatory faucets other than residential</td>
</tr>
<tr>
<td>Metering faucets</td>
</tr>
<tr>
<td>Metering faucets for wash fountains</td>
</tr>
<tr>
<td>Wash fountains</td>
</tr>
<tr>
<td>Water Closets</td>
</tr>
<tr>
<td>Urinals</td>
</tr>
<tr>
<td>Commercial Pre-Rinse Spray Valves</td>
</tr>
<tr>
<td>RESIDENTIAL</td>
</tr>
<tr>
<td>Kitchen faucets</td>
</tr>
<tr>
<td>NON-RESIDENTIAL</td>
</tr>
<tr>
<td>Lavatory faucets (metering)</td>
</tr>
<tr>
<td>Pre-rinse spray valves</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Wash fountains (metering)</td>
</tr>
<tr>
<td>Wash fountains (non-metering)</td>
</tr>
</tbody>
</table>
**BOTH RESIDENTIAL AND NON-RESIDENTIAL**

<table>
<thead>
<tr>
<th>Showerheads</th>
<th>2.0 gpm at 80 psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water closets</td>
<td>1.28 gpf</td>
</tr>
<tr>
<td>Urinals</td>
<td>0.5 gpf</td>
</tr>
</tbody>
</table>

For SI units: 1 gallon = 3.785 L, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 ounce-force = 0.278 N, 1 ounce-force = 28.3495 grams-force

### Notes:

1. For multiple showerheads serving one shower compartment see Section 402.6.1.
2. Shall also be listed to EPA WaterSense Specification for Tank-Type Toilets.
3. Shall also be listed to EPA WaterSense Specification for Flushing Urinals. Nonwater urinals shall meet the specifications listed in Section 402.3.1.
4. See Section 402.4.
5. Maximum flow rate per fixture fitting.
6. For temporary increased flow above the maximum rate, see Section 402.4.

---

### 402.2 Water Closets.

No water closet shall have an effective flush volume exceeding 1.28 gallons (4.8 Lpf) per flush (gpf). Water closets shall be in accordance with Section 402.2.1 and Section 402.2.2.

#### 402.2.1 Gravity, Pressure Assisted and Electro-Hydraulic Tank Type Water Closets.

Gravity, pressure assisted, and electro-hydraulic tank type water closets shall have a maximum effective flush volume of not more than 1.28 gallons (4.8 Lpf) of water per flush in accordance with ASME A112.19.2/CSA B45.1 or ASME A112.19.14 and shall also be listed to the EPA WaterSense Specification for Tank-Type Toilets. The effective flush volume for dual-flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

#### 402.2.2 Flushometer-Valve Activated Water Closets.

Flushometer-valve activated water closets shall have a maximum flush volume of not more than 1.28 gallons (4.8 L) of water per flush in accordance with ASME A112.19.2/CSA B45.1 and shall be listed to the EPA WaterSense Specification for Flushometer-Valve Water Closets.

### 402.3 Urinals.

Urinals shall have a maximum flush volume of not more than 0.50 gallons (1.9 L) of water per flush in accordance with ASME A112.19.2/CSA B45.1 or CSA B45.5/IAPMO Z124. Flushing urinals shall be listed to the EPA WaterSense Specification for Flushing Urinals.

#### 402.3.2 Nonwater Urinals with Drain Cleansing Action.

Nonwater 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.

### 402.4 Residential Kitchen Faucets.

The maximum flow rate of residential kitchen faucets shall not exceed 1.8 gallons (6.8 L/m) at 60 pounds-force per square inch (psi) (414 kPa). Kitchen faucets shall be permitted to temporarily increase the flow above the maximum rate, but not to exceed 2.2 gpm (8.3 L/m) at 60 psi (414 kPa), and must revert to a maximum flow rate of 1.8 gpm (6.8 L/m) at 60 psi (414 kPa) in accordance with Table 402.1 upon valve closure.

### 402.5 Lavatory Faucets.

The maximum water flow rate of lavatory faucets shall be in accordance with Section 402.5.1 and Section 402.5.2.

#### 402.5.1 Lavatory Faucets in Residences, Apartments, and Private Bathrooms in Lodging Facilities, Hospitals, and Patient Care Facilities.

The flow rate for lavatory faucets installed in residences, apartments, and private bathrooms in lodging, hospitals, and patient care facilities (including skilled nursing and long-term care facilities) shall not exceed 1.5 gpm (5.7 L/m) at 60 psi (414 kPa) in accordance with ASME A112.18.1/CSA B125.1 and shall be listed to the U.S. EPA WaterSense High-Efficiency Lavatory Faucet Specification.

#### 402.5.2 Lavatory Faucets in Other Than Residences, Apartments, and Private Bathrooms in Lodging Facilities.

Lavatory faucets installed in bathrooms of buildings or occupancies other than those specified in Section 402.5.1 shall be in accordance with Section 402.5.2.1 or Section 402.5.2.2.

##### 402.5.2.1 Maximum Flow Rate.

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

##### 402.5.2.2 Metering Faucets.

Metering faucets shall deliver not more than 0.25 gallons (1.0 L) of water per cycle.
402.6 Showerheads. Showerheads shall not exceed a flow rate of 2.0 gpm (7.6 L/m) at 80 psi (552 kPa) and shall be listed to comply with ASME A112.18.1/CSA B125.1 and shall be listed to the EPA WaterSense Specification for Showerheads.

(Section 402.6.1 is shown for information purposes only)

402.6.1 Multiple Showerheads Serving One Shower Compartment. The total allowable flow rate of water from multiple showerheads flowing at any given time, with or without a diverter, including rain systems, waterfalls, bodysprays, and jets, shall not exceed 2.0 gpm (7.6 L/m) per shower compartment, where the floor area of the shower compartment is less than 1800 square inches (1.161 m²). For each increment of 1800 square inches (1.161 m²) of floor area thereafter or part thereof, additional showerheads are allowed, provided the total flow rate of water from all flowing devices shall not exceed 2.0 gpm (7.6 L/m) for each such increment.

Exceptions:
(1) Gang showers in non-residential occupancies. Singular showerheads or multiple show outlets serving one showering position in gang showers shall not have more than 2.0 gpm (7.6 L/m) total flow.
(2) Where provided, shower compartments required for persons with disabilities in accordance with Table 1201.1 shall not have more than 4.0 gpm (15.0 L/m) total flow, where one outlet is the hand shower.

402.11 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 the maximum flow rate, as specified in Table 402.11. 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.

<table>
<thead>
<tr>
<th>PRODUCT CLASS BY SPRAY FORCE</th>
<th>MAXIMUM FLOW RATE (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Class 1 (&lt;= 5.0 ounces-force)</td>
<td>1.00</td>
</tr>
<tr>
<td>Product Class 2 (&gt; 5.0 ounces-force and &lt;= 8.0 ounces-force)</td>
<td>1.20</td>
</tr>
<tr>
<td>Product Class 3 (&gt; 8.0 ounces-force)</td>
<td>1.28</td>
</tr>
</tbody>
</table>

For SI units: 1 gallon per minute = 3.785 L/min, 1 ounce-force = 0.0625 pound-force.

402.12 Wash Fountains. Wash fountains shall be installed with not less than one fixture fitting per 20 inches (508 mm) of rim space.

402.12-402.13 Emergency Safety Showers and Eye Wash Stations. Emergency safety showers and emergency eye wash stations shall not be limited in their water supply flow rates.

(renumber remaining sections)

SUBSTANTIATION:
There are a few concerns with Section 402.0 (Water-Conserving Plumbing Fixtures and Fittings) that may be resolved by consolidating and removing repetitive requirements. I have provided potential resolutions in the form of three options submitted as public comments:

Option 1 (See Public Comment #1): Table 402.1 can serve as the sole location for listing maximum flow rates of fixtures and fixture fittings. This prevents potential conflicts as later editions of the standard are published and new information is incorporated. This table should also be categorized based on application (residential, non-residential, or both). The notes accompanying the table should not include listing requirements, but rather specific information needed to interpret and apply requirements presented. Such listing requirements should remain only in the specific section that addresses the fixture or fitting type. In line with this approach, Section 402.12 (Wash Fountains) is being added to relocate existing requirements from Table 402.1 which address the required number of fixture fittings per length of rim space as this pertains to installation and not flow rates. This is needed since note (1) of Table 402.1 states that the maximum flow rates prescribed are “per fixture fitting.” This option also includes the maximum flow rates for pre-rinse spray valves that were accepted during the proposal stage. At a minimum,
revisions should be incorporated from Option 1 to address needed wordsmithing and improve code language. Since the Technical Committee has the power to amend public comments, I am hoping that either in whole or in part these needed updates are approved.

Option 2 (See Public Comment #2): Table 402.1 can be updated to include the maximum flow rates for commercial pre-rinse spray valves that were accepted during the proposal stage, and the maximum flow rates can also be mentioned in-text. The notes, as mentioned above, should avoid listing requirements and should leave such information in the specific section that addresses the fixture or fitting type. This option also includes proposed Section 402.12 (Wash Fountains) which relocates installation requirements. The list of fixture types was then reorganized into alphabetical order. All EPA WaterSense Specifications, that were proposed as new notes, are already found in their respective sections. This option most closely addresses the concerns expressed by the Technical Committee for rejecting Item #045. The sections currently referencing these EPA WaterSense Specifications are shown for information. Also shown for information are other relevant referenced sections.

Option 3 (See Public Comment #3): Table 402.1 can be deleted in its entirety, and the maximum fixture flow rates can be dictated solely in-text. In this case, Section 402.12 (Wash Fountains) and respective subsections should be added to address the maximum flow rates that existed in Table 402.1.

In any case, the minimum flow rate provided in Table 402.1 for commercial pre-rinse spray valves needs to be updated if none of these options are approved.

PUBLIC COMMENT 2

Code Year: 2023 WEStand  Section #: 402.1, 402.11 - 402.13, Table 402.1, Table 402.11  Item #: 045

SUBMITTER: Monte Myers
Self

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

402.0 Water-Conserving Plumbing Fixtures and Fittings.
402.1 General. The maximum water consumption of fixtures and fixture fittings shall comply with the flow rates specified in Table 402.1 and Section 402.2 through Section 402.13.

| TABLE 402.1  
MAXIMUM FIXTURE AND FIXTURE FITTINGS FLOW RATES |
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FIXTURE TYPE</td>
</tr>
<tr>
<td>Showerheads</td>
</tr>
<tr>
<td>Kitchen faucets residential</td>
</tr>
<tr>
<td>Lavatory faucets residential</td>
</tr>
<tr>
<td>Lavatory faucets other than residential</td>
</tr>
<tr>
<td>Metering faucets</td>
</tr>
<tr>
<td>Metering faucets for wash fountains</td>
</tr>
<tr>
<td>Wash fountains</td>
</tr>
<tr>
<td>Water Closets</td>
</tr>
<tr>
<td>Urinals</td>
</tr>
<tr>
<td>Commercial Pre-Rinse Spray Valves</td>
</tr>
<tr>
<td>Kitchen faucets (residential)</td>
</tr>
<tr>
<td>Fixture Type</td>
</tr>
<tr>
<td>------------------------------------</td>
</tr>
<tr>
<td>Lavatory faucets (residential)³</td>
</tr>
<tr>
<td>Lavatory faucets (metering)⁴</td>
</tr>
<tr>
<td>Lavatory faucets (non-metering)⁴</td>
</tr>
<tr>
<td>Commercial pre-rinse spray valves</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Showerheads⁶</td>
</tr>
<tr>
<td>Water closets</td>
</tr>
<tr>
<td>Wash fountains (metering)</td>
</tr>
<tr>
<td>Wash fountains (non-metering)</td>
</tr>
<tr>
<td>Urinals</td>
</tr>
</tbody>
</table>

For SI units: 1 gallon = 3.785 L, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 ounce-force = 0.278 N, 1 ounce-force = 28.3495 grams-force.

Note:
1. For multiple showerheads serving one shower compartment see Section 402.6.1.
2. Shall also be listed to EPA WaterSense Specification for Tank-Type Toilets.
3. Shall also be listed to EPA WaterSense Specification for Flushing Urinals. Nonwater urinals shall meet the specifications listed in Section 402.3.4.
4. See Section 402.4.
5. 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).
6. For multiple showerheads serving a single shower compartment, the total allowable flow rate shall be in accordance with Section 402.6.1.

402.11 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 the maximum flow rate, as specified in Table 402.11. 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.

**TABLE 402.11**

<table>
<thead>
<tr>
<th>Product Class by Spray Force</th>
<th>Maximum Flow Rate (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Class 1 (≤ 5.0 ounces-force)</td>
<td>1.00</td>
</tr>
<tr>
<td>Product Class 2 (&gt; 5.0 ounces-force and ≤ 8.0 ounces-force)</td>
<td>1.20</td>
</tr>
<tr>
<td>Product Class 3 (&gt; 8.0 ounces-force)</td>
<td>1.28</td>
</tr>
</tbody>
</table>

For SI units: 1 gallon per minute = 3.785 L/min, 1 ounce-force = 0.0625 pound-force.

402.12 Wash Fountains. Wash fountains shall be installed with not less than one fixture fitting per 20 inches (508 mm) of rim space.

402.12-402.13 Emergency Safety Showers and Eye Wash Stations. Emergency safety showers and emergency eye wash stations shall not be limited in their water supply flow rates.

(renumber remaining sections)
402.2 Water Closets. No water closet shall have an effective flush volume exceeding 1.28 gallons (4.8 Lpf) per flush (gpf).

402.2.1 Gravity, Pressure Assisted and Electro-Hydraulic Tank Type Water Closets. Gravity, pressure assisted, and electro-hydraulic tank type water closets shall have a maximum effective flush volume of not more than 1.28 gallons (4.8 Lpf) of water per flush in accordance with ASME A112.19.2/CSA B45.1 and ASME A112.19.14 and shall also be listed to the EPA WaterSense Specification for Tank-Type Toilets. The effective flush volume for dual-flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

402.2.2 Flushometer-Valve Activated Water Closets. Flushometer-valve activated water closets shall have a maximum flush volume of not more than 1.28 gallons (4.8 L) of water per flush in accordance with ASME A112.19.2/CSA B45.1 and shall be listed to the EPA WaterSense Specification for Flushometer-Value Water Closets.

402.3 Urinals. Urinals shall have a maximum flush volume of not more than 0.50 gallons (1.9 L) of water per flush in accordance with ASME A112.19.2/CSA B45.1 or CSA B45.5/IAPMO Z124. Flushing urinals shall be listed to the EPA WaterSense Specification for Flushing Urinals.

402.4 Residential Kitchen Faucets. The maximum flow rate of residential kitchen faucets shall not exceed 1.8 gallons per minute (gpm) (6.8 L/m) at 60 pounds-force per square inch (psi) (414 kPa). Kitchen faucets are permitted to temporarily increase the flow above the maximum rate, but not to exceed 2.2 gpm (8.3 L/m) at 60 psi (414 kPa), and must revert to a maximum flow rate of 1.6 gpm (6.8 L/m) at 60 psi (414 kPa) upon valve closure.

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

402.6.1 Multiple Showerheads Serving One Shower Compartment. The total allowable flow rate of water from multiple showerheads flowing at any given time, with or without a diverter, including rain systems, waterfalls, bodysprays, and jets, shall not exceed 2.0 gpm (7.6 L/m) per shower compartment, where the floor area of the shower compartment is less than 1800 square inches (1.161 m²). For each increment of 1800 square inches (1.161 m²) of floor area thereafter or part thereof, additional showerheads are allowed, provided the total flow rate of water from all flowing devices shall not exceed 2.0 gpm (7.6 L/m) for each such increment.

Exceptions:
(1) Gang showers in non-residential occupancies. Singular showerheads or multiple show outlets serving one showering position in gang showers shall not have more than 2.0 gpm (7.6 L/m) total flow.
(2) Where provided, shower compartments required for persons with disabilities in accordance with Table 1201.1 shall not have more than 4.0 gpm (15.0 L/m) total flow, where one outlet is the hand shower.

SUBSTANTIATION:
There are a few concerns with Section 402.0 (Water-Conserving Plumbing Fixtures and Fittings) that may be resolved by consolidating and removing repetitive requirements. I have provided potential resolutions in the form of three options submitted as public comments:

Option 1 (See Public Comment #1): Table 402.1 can serve as the sole location for listing maximum flow rates of fixtures and fixture fittings. This prevents potential conflicts as later editions of the standard are published and new information is incorporated. This table should also be categorized based on application (residential, non-residential, or both). The notes accompanying the table should not include listing requirements, but rather specific information needed to interpret and apply requirements presented. Such listing requirements should remain only in the specific section that addresses the fixture or fitting type. In line with this approach, Section 402.12 (Wash Fountains) is being added to relocate existing requirements from Table 402.1 which address the required number of fixture fittings per length of rim space as this pertains to installation and not flow rates. This is needed since note (1) of Table 402.1 states that the maximum flow rates prescribed are “per fixture fitting.” This option also includes the maximum flow rates for pre-rinse spray valves that were accepted during the proposal stage. At a minimum, revisions should be incorporated from Option 1 to address needed wordsmithing and improve code language. Since the Technical Committee has the power to amend public comments, I am hoping that either in whole or in part these needed updates are approved.

Option 2 (See Public Comment #2): Table 402.1 can be updated to include the maximum flow rates for commercial pre-rinse spray valves that were accepted during the proposal stage, and the maximum flow rates can also be mentioned in-text. The notes, as mentioned above, should avoid listing requirements and should leave such information in the specific section that addresses the fixture or fitting type. This option also includes proposed Section 402.12 (Wash Fountains) which relocates installation requirements. The list of fixture types was then reorganized into alphabetical order. All EPA WaterSense Specifications, that were proposed as new notes, are already found in their respective sections. This option most closely addresses the concerns expressed by the Technical Committee for rejecting Item #045. The sections currently referencing these EPA WaterSense Specifications are shown for information. Also shown for information are other relevant referenced sections.
Option 3 (See Public Comment #3): Table 402.1 can be deleted in its entirety, and the maximum fixture flow rates can be dictated solely in-text. In this case, Section 402.12 (Wash Fountains) and respective subsections should be added to address the maximum flow rates that existed in Table 402.1.

In any case, the minimum flow rate provided in Table 402.1 for commercial pre-rinse spray valves needs to be updated if none of these options are approved.

PUBLIC COMMENT 3

Code Year: 2023 WEStand  Section #: 402.1, 402.12 - 402.13, Table 402.1  Item #: 045

SUBMITTER: Monte Myers  Self

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

402.0 Water-Conserving Plumbing Fixtures and Fittings.
402.1 General. The maximum water consumption of fixtures and fixture fittings shall comply with the flow rates specified in Table 402.1 and Section 402.2 through Section 402.4013.

<table>
<thead>
<tr>
<th>TABLE 402.1</th>
<th>MAXIMUM FIXTURE AND FIXTURE FITTINGS FLOW RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIXTURE TYPE</td>
<td>FLOW RATE</td>
</tr>
<tr>
<td>Showerheads</td>
<td>2.0 gpm @ 80 psi</td>
</tr>
<tr>
<td>Kitchen faucets residential</td>
<td>1.5 gpm @ 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets residential</td>
<td>0.5 gpm @ 60 psi</td>
</tr>
<tr>
<td>Metering faucets</td>
<td>0.25 gallons/cycle</td>
</tr>
<tr>
<td>Metering faucets for wash fountains</td>
<td>One (1) 0.25 gal per cycle fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Wash fountains</td>
<td>One (1) 2.2 gpm @ 60 psi fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Water Closets</td>
<td>1.28 gallons/flush</td>
</tr>
<tr>
<td>Urinals</td>
<td>0.5 gallons/flush</td>
</tr>
<tr>
<td>Commercial Pre-Rinse Spray Valves</td>
<td>1.3 gpm @ 60 psi</td>
</tr>
</tbody>
</table>

1. For multiple showerheads serving one shower compartment see Section 402.6.1
2. Shall also be listed to EPA WaterSense Specification for Tank-Type Toilets.
3. Shall also be listed to EPA WaterSense Specification for Flushing Urinals. Nonwater urinals shall meet the specifications listed in Section 402.3.1.
4. See Section 402.4.

402.12 Wash Fountains. Wash fountains shall be installed with not less than one fixture fitting per 20 inches (508 mm) of rim space. The maximum flow rate of fixture fittings shall be in accordance with Section 402.12.1 and Section 402.12.2.

402.12.1 Maximum Flow Rate. The flow rate of each fixture fitting shall not exceed 2.2 gpm (8.3 L/min) at 60 psi (414 kPa).

402.12.2 Metering. Where metering fixture fittings are installed in wash fountains, each fitting shall deliver not more than 0.25 gallons (0.95 L) of water per cycle.

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

(renumber remaining sections)
SUBSTANTIATION:
There are a few concerns with Section 402.0 (Water-Conserving Plumbing Fixtures and Fittings) that may be resolved by consolidating and removing repetitive requirements. I have provided potential resolutions in the form of three options submitted as public comments:

Option 1 (See Public Comment #1): Table 402.1 can serve as the sole location for listing maximum flow rates of fixtures and fixture fittings. This prevents potential conflicts as later editions of the standard are published and new information is incorporated. This table should also be categorized based on application (residential, non-residential, or both). The notes accompanying the table should not include listing requirements, but rather specific information needed to interpret and apply requirements presented. Such listing requirements should remain only in the specific section that addresses the fixture or fitting type. In line with this approach, Section 402.12 (Wash Fountains) is being added to relocate existing requirements from Table 402.1 which address the required number of fixture fittings per length of rim space as this pertains to installation and not flow rates. This is needed since note (1) of Table 402.1 states that the maximum flow rates prescribed are “per fixture fitting.” This option also includes the maximum flow rates for pre-rinse spray valves that were accepted during the proposal stage. At a minimum, revisions should be incorporated from Option 1 to address needed wordsmithing and improve code language. Since the Technical Committee has the power to amend public comments, I am hoping that either in whole or in part these needed updates are approved.

Option 2 (See Public Comment #2): Table 402.1 can be updated to include the maximum flow rates for commercial pre-rinse spray valves that were accepted during the proposal stage, and the maximum flow rates can also be mentioned in-text. The notes, as mentioned above, should avoid listing requirements and should leave such information in the specific section that addresses the fixture or fitting type. This option also includes proposed Section 402.12 (Wash Fountains) which relocates installation requirements. The list of fixture types was then reorganized into alphabetical order. All EPA WaterSense Specifications, that were proposed as new notes, are already found in their respective sections. This option most closely addresses the concerns expressed by the Technical Committee for rejecting Item #045. The sections currently referencing these EPA WaterSense Specifications are shown for information. Also shown for information are other relevant referenced sections.

Option 3 (See Public Comment #3): Table 402.1 can be deleted in its entirety, and the maximum fixture flow rates can be dictated solely in-text. In this case, Section 402.12 (Wash Fountains) and respective subsections should be added to address the maximum flow rates that existed in Table 402.1.

In any case, the minimum flow rate provided in Table 402.1 for commercial pre-rinse spray valves needs to be updated if none of these options are approved.

PUBLIC COMMENT 4
Code Year: 2023 WEStand  Section #: 402.6.1
SUBMITTER: Adam Segura
Self
RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal as submitted by this public comment.

402.0 Water-Conserving Plumbing Fixtures and Fittings.

402.6 Showerheads. (remaining text unchanged)
402.6.1 Multiple Showerheads Serving One Shower Compartment. The total allowable flow rate of water from multiple showerheads flowing at any given time, with or without a diverter, including rain systems, waterfalls, bodysprays, and jets, shall not exceed 2.0 gpm (7.6 L/m) per shower compartment, where the floor area of the shower compartment is less than 1800 square inches (1.161 m²). For each increment of 1800 square inches (1.161 m²) of floor area thereafter or part thereof, additional showerheads are allowed, provided the total flow rate of water from all flowing devices shall not exceed 2.0 gpm (7.6 L/m) for each such increment.
Exceptions:
(1) Gang showers in non-residential occupancies. Singular showerheads or multiple shower outlets serving one showering position in gang showers shall not have more than 2.0 gpm (7.6 L/m) total flow.
(2) Where provided, shower compartments required for persons with disabilities in accordance with Table 1201.1—CSA B651 or ICC A117.1 shall not have more than 4.0 gpm (15.0 L/m) total flow, where one outlet is the hand shower.

(below shown for information purposes only)

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSA B651-2018</td>
<td>Accessible Design for the Built Environment</td>
<td>402.6.1(2)</td>
</tr>
</tbody>
</table>

Note: CSA B651 and ICC A117.1 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
Section 402.6.1 (Multiple Showerheads Serving One Shower Compartment) is being updated to reference CSA B651 and ICC A117.1 for ADA compliance. Both of these standards are already included in Table 1201.1 (Referenced Standards) with this section listed as its appropriate location, and they should be included within the text as well. All standards in Table 1201.1 must be referenced in the body of standard, and this public comment corrects that issue. An additional minor revision was also made to update “multiple show outlets” to “multiple shower outlets” as this may have been an oversight.

PUBLIC COMMENT 5

Code Year: 2023 WEStand  Section #: 402.6.1  Item #: 045
SUBMITTER: Adam Segura  Self  Comment #: 5
RECOMMENDATION: Accept as Modified

Request to replace the code change proposal as submitted by this public comment.

402.6 Water-Conserving Plumbing Fixtures and Fittings.

402.6.1 Multiple Showerheads Serving One Shower Compartment. The total allowable flow rate of water from multiple showerheads flowing at any given time, with or without a diverter, including rain systems, waterfalls, bodysprays, and jets, shall not exceed 2.0 gpm (7.6 L/m) per shower compartment, where the floor area of the shower compartment is less than 1800 square inches (1.161 m²). For each increment of 1800 square inches (1.161 m²) of floor area thereafter or part thereof, additional showerheads are allowed, provided the total flow rate of water from all flowing devices shall not exceed 2.0 gpm (7.6 L/m) for each such increment.

Exceptions:
(1) For gang showers in non-residential occupancies, singular showerheads or multiple shower outlets serving one showering position in gang showers shall not have more than exceed 2.0 gpm (7.6 L/m) in total flow.
(2) Where provided, shower compartments required for persons with disabilities in accordance with Table 1201.1—CSA B651 or ICC A117.1 shall not have more than exceed 4.0 gpm (15.0 L/m) in total flow, where one outlet is the hand shower.
### TABLE 1201.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
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<tr>
<td>CSA B651-2018</td>
<td>Accessible Design for the Built Environment</td>
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</tbody>
</table>

*Note: CSA B651 and ICC A117.1 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.*

**SUBSTANTIATION:**
In addition to the references made to CSA B651 and ICC A117.1 in my previous submission (See Public Comment #4), other revisions were made to improve or clean-up language. In Exception (1), the modification updates “non-residential occupancies” to “non-residential buildings” along with other minor revisions. Exception (2) was revised for consistency and to remove unnecessary verbiage.
Item #: 046
WEStand 2023  Section: 402.7

SUBMITTER: Kyle Thompson
Plumbing Manufacturers International (PMI)

RECOMMENDATION:
Revise text

402.7 Bath and Shower Diverters. Tub spout bath and shower diverters, while operating in the shower mode, shall have a maximum leakage rate of 0.01 gpm (0.04 L/min) when tested in accordance with ASME A112.18.1/CSA B125.1.

Note: ASME A112.18.1/CSA B125.1 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
As written, the existing code section does nothing to prevent unnecessary leakages of a diverter. If a diverter is going to leak, it will occur over the lifetime use of the diverter and not during the installation when inspected by the AHJ. What is important is that the diverter meets the performance requirements of ASME A112.18.1/CSA B125.1 which are addressed in Section 5.3.6 of the standard. Testing the rate of leakage is intended to be conducted in a laboratory and not in the field, where the accuracy of such testing can be jeopardized. The maximum leakage rate of 0.01 gpm for tub spout diverters is currently specified in Table H-3 of 20 CCR § 1605.3.

20 CCR § 1605.3 State Standards for Non-Federally-Regulated Appliances may be accessed via the following link: https://govt.westlaw.com/calregs/Document/ID57ED4435CCE11EC9220000D3A7C4BC3?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageltem&contextData=(sc.Default)

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 17  NEGATIVE: 11  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Note: Item # 046 failed to achieve the necessary two-thirds affirmative vote of returned ballots. In accordance with Section 6.8.2 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard, a public comment is requested for this proposal. The Technical Committee will reconsider this proposal as a public comment.

EXPLANATION OF AFFIRMATIVE:

CUDAHY: Zero leakage is not achievable.
KENDZEL: Referencing the existing national consensus standard for bath and shower diverters is appropriate and using a technically sound and correct leakage test referenced in the ASME standard is also appropriate. Indicating a "zero leakage" without referencing a means to test and a verifiable measurement provides no sound mandate. I do not see the referencing of the product national standard requirement as weakening the standard; it provides a requirement that is easily validated and tested during the certification/listing process.

MANN: There is an existing standard for testing and that should be used. The inspector may or may not pull up the spout diverter to find out if it leaks or not. The product may have zero leakage when tested but will never remain at zero. They are mechanical devices and will fail over time.

THOMPSON: The existing text in this section specifies a performance requirement of "zero leakage" without providing a means by which a product can demonstrate such performance. The value zero is not possible to measure with existing technology since measurement devices have an inherent limit of resolution and there are no state or federal standards upon which a manufacturer can test or certify that their diverters are truly "zero leakage."

This proposed revision addresses these limitations by including a small maximum leakage rate and a reference to the test method for verification. The standard ASME A112.18.1/CSA B125.1 specifies how a manufacturer is to test these products and Section 5.3.6 includes a leakage rate test. As noted in the proposal substantiation, the maximum leakage rate in the California Code of Regulations is 0.01 gpm for tub spout diverters which is specified in Table H-3 of 20 CCR § 1605.3.

EXPLANATION OF NEGATIVE:
ALLEN: I agree with Edward Osann and Thomas Pape. We should not weaken this standard.

KLEIN: WE•Stand needs to lead the way. Zero leakage is obtainable, and we should not weaken the standard.

KOELLER: What the proponent of this proposal is attempting to do is change a provision that was debated extensively and voted upon in the previous round of WE•Stand several years ago. The "substantiation" offered here by the proponent is exactly what justifies its rejection. OF COURSE, the current provisions in WE•Stand do not "prevent" leakage in the future. JUST AS a showerhead flow rate limitation requirement doesn't prevent a higher flow in that showerhead in the future, or a faucet or toilet, for that matter. What WE•Stand has provided for (and the proponent of this modification is attempting to overturn) is a specified performance WHEN NEW! That is all such a specification can provide!

Furthermore, there is NO NEED to test a diverter in the "field" as the proponent inaccurately describes. The California Energy Commission already qualifies products through an independent testing process by accredited laboratories that results in a LISTING (just as is done for numerous other plumbing products). As such, the "substantiation" is irrelevant and does not fit the 'real world' situation with today's diverters, their testing, their listing, and their application as a water use efficiency provision. To provide further clarification on Mr. Markus Lenger's comment, zero leakage not only "should be" achievable but, in fact, IS achievable and has been so for many years. In fact, in 2015, there were 360 different diverter models in the CEC listings that were "zero leakage." Undoubtedly, there are many more today.

LANDO: I agree with the comments of the other negative votes and the proposals weakening of the WE•Stand. This proposal was debated extensively in previous WE•Stand additions where it was rejected. It continues to be brought forward and rejected over its merits.

LAYTON: We should not settle for minimal leakage just because we have a standard to test for the leakage.

LENGER: Zero leakage should be achievable.

OSANN: This proposal is an unjustified weakening of WE•Stand. Manufacturers have provided test data to the California Energy Commission on over 10,000 models of tub spout diverters (TSDs), and over 60% of these models are listed at zero leakage. "Zero" leakage is actually far easier to verify in field inspection than trying to measure the fraction of a gallon per minute that the proposal would offer as a replacement. I agree that even more savings could come from an improved durability standard for TSDs, and invite the proponent to join in efforts to strengthen this part of the standard, rather than weakening the zero leakage at installation requirement in WE•Stand.

PAPE: There is ample technology available in the marketplace to have zero leakage. It is confounding that WE•Stand allows products included, known to leak at day one. This is a stretch code not the UPC, for cripes sake, we should not bend our goals to appease a manufacturer.

PREMER: Allowing leakage is not in congruence with WE•Stand goals.
SOVOCOOL: Agree with Commenters. Going further, having an inspector finding a leaking diverter valve in a WE•Stand installation hurts the credibility of the standard. Even worse? The customer finding it.

WHITE: This has been highly debated and continues to show up. As a stretch code, it should be acceptable to go beyond the minimum requirements.

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 402.7  Item #: 046
SUBMITTER: Kyle Thompson  Plumbing Manufacturers International (PMI)  Comment #: 1
RECOMMENDATION:
Accept as Submitted
Request to accept the code change proposal as submitted by this public comment.

SUBSTANTIATION:
As written, the existing code section does nothing to prevent unnecessary leakages of a diverter. If a diverter is going to leak, it will occur over the lifetime use of the diverter and not during the installation when inspected by the AHJ. What is important is that the diverter meets the performance requirements of ASME A112.18.1/CSA B125.1 which are addressed in Section 5.3.6 of the standard. Testing the rate of leakage is intended to be conducted in a laboratory and not in the field, where the accuracy of such testing can be jeopardized. The maximum leakage rate of 0.01 gpm for tub spout diverters is currently specified in Table H-3 of 20 CCR § 1605.3.

20 CCR § 1605.3 State Standards for Non-Federally-Regulated Appliances may be accessed via the following link: https://govt.westlaw.com/calregs/Document/ID57ED4435CCE11EC9220000D3A7C4BC3?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)

[Supporting documentation is provided in KAVI for TC review]
Proposals

Item #: 047
WEStand 2023 Section: 402.8.1

SUBMITTER: Kyle Thompson
Plumbing Manufacturers International (PMI)

RECOMMENDATION:
Delete text without substitution

402.0 Water-Conserving Plumbing Fixtures and Fittings.

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

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

(Section 402.8 is shown for information purposes only)

SUBSTANTIATION:
Marking requirements are already addressed in the applicable product standards (ex: ASSE 1016/ASME A112.1016/CSA B125.16 – Section V) and do not belong in the code. Therefore, such provisions should be vetted first through the appropriate standard development committee. In addition, such requirements for tags, labels, and markings are unnecessary as this information is generally available on the manufacturer's website.

The requirement in the code is unclear as to what is meant by visible after installation. Whether that means after the control valve is installed, or after the finishing trim of the shower is installed, the language is unclear. Markings on escutcheons or other trim components are not possible in all applications as these parts are used on a multitude of different products.

Research conducted by manufacturers has determined that a majority of consumers desire a minimal number of markings on escutcheons or other trim components. Which effectively means that any such temporary tag, label, or marking will most likely be removed by the consumer before a new showerhead is installed.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
Section 402.8.1 (Marking) is needed as such requirements are not directly covered within the ASSE 1016/ASME A112.1016/CSA B125.16 standard. Without disassembling a unit, the rated flow for the mixing valve and thermal protection should be known. The showerhead selected for future installation may not be compatible with the thermal protection of the system.

Valves tested with showerheads have a minimum flow rate approved for safe use. Information on rated flow is difficult to find and often must be sourced by contacting the manufacturer. Showerheads are one of the most frequently changed fixtures, and such language must be readily available to ensure compatibility and safe operation. If this language is removed, it poses as a health and safety hazard for users and consumers.
Note: Item # 047 failed to achieve the necessary two-thirds affirmative vote of returned ballots. In accordance with Section 6.8.2 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard, a public comment is requested for this proposal. The Technical Committee will reconsider this proposal as a public comment.

EXPLANATION OF NEGATIVE:

BARNES: I agree with the original substantiation provided by PMI. The current language regarding marking is not enforceable and should be removed from this section. The applicable product standards address marking requirements; these standards should be reconsidered before adding additional marking requirements in WE•Stand.

CUDAHY: The language is not enforceable and is unclear.

GRANGER: The language is unclear and not enforceable.

KENDZEL: I do not believe the current language is enforceable and is also not practical for applying at the point of manufacture or in the field. Although I agree with the intent behind the current wording, I think further discussions are required to come up with a workable solution which I am in the process of completing. Until a workable solution is developed, the current text should be deleted from the standard.

LAYTON: Products are required to be manufactured to ASSE 1016/ASME A112.1016/CSA B125.16 requirements. Adding this language to WE•Stand is not enforceable.

MANN: After further review, I am trying to figure out what the purpose is of this requirement. The valve and shower head generally come as a kit. If one is trying to protect the end user (homeowner), forget that. They will not understand what this marking means. This is overly restrictive to our manufacturing industries’ costs for something that the installer already knows, and the end user has no clue.

MCLEOD: The language is not enforceable and is unclear. Additionally, markings on escutcheons or other trim components are not possible in all applications as these parts are used on a multitude of different products.

PREMER: I am in agreement with Cambria McLeod’s comment.

SEWELL: The language is not enforceable and is unclear. Additionally, markings on escutcheons or other trim components are not possible in all applications.

SMITH: I agree with Cambria McLeod as written here: “The language is not enforceable and is unclear. Additionally, markings on escutcheons or other trim components are not possible in all applications as these parts are used on a multitude of different products.”

THOMPSON: The existing language is unenforceable. Tags or labels as currently required are likely be discarded before the device is installed. Compliance with ASSE 1016 requires identification markings on the device and the minimum flow rates to be included on the product packaging or literature and if needed for future replacement an installer can track down the information through the products identification markings.

Appendixed Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 402.8.1

SUBMITTER: Kyle Thompson
Plumbing Manufacturers International (PMI)

RECOMMENDATION:
Accept as Submitted
Request to accept the code change proposal as submitted by this public comment.

SUBSTANTIATION:
Marking requirements are already addressed in the applicable product standards (ex: ASSE 1016/ASME A112.1016/CSA B125.16 – Section V) and do not belong in the code. Therefore, such provisions should be vetted first through the appropriate standard development committee. In addition, such requirements for tags, labels, and markings are unnecessary as this information is generally available on the manufacturer’s website.

The requirement in the code is unclear as to what is meant by visible after installation. Whether that means after the control valve is installed, or after the finishing trim of the shower is installed, the language is unclear. Markings on escutcheons or other trim components are not possible in all applications as these parts are used on a multitude of different products.

Research conducted by manufacturers has determined that a majority of consumers desire a minimal number of markings on escutcheons or other trim components. Which effectively means that any such temporary tag, label, or marking will most likely be removed by the consumer before a new showerhead is installed.
402.0 Water-Conserving Plumbing Fixtures and Fittings.

402.10 Bath and Shower Flow-Reduction Devices. Bath and shower flow-reduction devices shall comply with IAPMO IGC 244.

402.11 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/min) at 60 psi (414 kPa) the maximum flow rate, as specified in Table 402.11. Where pre-rinse spray valves with maximum flow rates of 1.0 gpm (3.8 L/min) 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.

For SI units: 1 gallon per minute = 3.785 L/min, 1 ounce-force = 0.0625 pound-force.

TABLE 402.11
COMMERCIAL PRE-RINSE SPRAY VALVE MAXIMUM FLOW RATE

<table>
<thead>
<tr>
<th>PRODUCT CLASS BY SPRAY FORCE</th>
<th>MAXIMUM FLOW RATE (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Class 1 (&lt;= 5.0 ounces-force)</td>
<td>1.00</td>
</tr>
<tr>
<td>Product Class 2 (&gt; 5.0 ounces-force and &lt;= 8.0 ounces-force)</td>
<td>1.20</td>
</tr>
<tr>
<td>Product Class 3 (&gt; 8.0 ounces-force)</td>
<td>1.28</td>
</tr>
</tbody>
</table>

TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 244-2021</td>
<td>Tub and Shower Flow-Reduction Systems</td>
<td>402.10</td>
</tr>
</tbody>
</table>

Note: IAPMO IGC 244 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.
SUBSTANTIATION:
Section 402.9 is being moved to a more appropriate location, and Section 402.10 is being proposed to address flow reduction devices with reference to IAPMO IGC 244. Tub and shower flow-reduction devices are intended for reducing the waste of water and energy by the use of a valve or system of valves that reduces the flow of water to a trickle once a set temperature is reached. This standard covers temperature-actuated flow-reduction devices and systems intended to be installed in tub spouts or immediately upstream of shower heads and specifies requirements for materials, physical characteristics, performance testing, and markings. Furthermore, Table 402.11 is being added as the Department of Energy currently requires all pre-rinse spray valves to have a maximum flow rate of 1.28 gallons per minute (or less, depending on the product’s spray force). Lastly, similar language was accepted by the UPC Technical Committee for Item #295 and Item #296.

See the energy conservation standards specified in the Code of Federal Regulations at 10 CFR 431.266:
https://www.law.cornell.edu/cfr/text/10/431.266

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS:  AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023  WEStand  Section #: Table 402.1

SUBMITTER: Jim Majerowicz
Plumbers Local Union 130 U.A.

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

TABLE 402.1
MAXIMUM FIXTURE AND FIXTURE FITTINGS FLOW RATES

<table>
<thead>
<tr>
<th>FIXTURE TYPE</th>
<th>FLOW RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Showerheads</td>
<td>2.0 gpm @ 80 psi</td>
</tr>
<tr>
<td>Kitchen faucets residential42</td>
<td>1.8 gpm @ 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets residential</td>
<td>1.5 gpm @ 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets other than residential</td>
<td>0.5 gpm @ 60 psi</td>
</tr>
<tr>
<td>Metering faucets</td>
<td>0.25 gallons/cycle</td>
</tr>
<tr>
<td>Metering faucets for wash fountains</td>
<td>One (1) 0.25 gal per cycle fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Wash fountains</td>
<td>One (1) 2.2 gpm @ 60 psi fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Water Closets</td>
<td>1.28 gallons/flush2</td>
</tr>
<tr>
<td>Urinals</td>
<td>0.5 gallons/flush3</td>
</tr>
<tr>
<td>Commercial Pre-Rinse Spray Valves3</td>
<td>1.3 gpm @ 60 psi, 1.28 gpm (&gt; 8.0 ozf)</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25.4 mm, 1 gallon = 3.785 L, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 ounce-force = 0.278 N, 1 ounce-force = 28.3495 grams-force

Notes:
1 For multiple showerheads serving one shower compartment see Section 402.6.1
2 Shall also be listed to EPA WaterSense Specification for Tank-Type Toilets.
3 Shall also be listed to EPA WaterSense Specification for Flushing Urinals. Nonwater urinals shall meet the specifications listed in Section 402.3.1.
42 See Section 402.4.
3 See Section 402.11 for the maximum flow rates based on product class and spray force.
**402.11 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 the maximum flow rate, as specified in Table 402.11. 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.

<table>
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<tr>
<th>PRODUCT CLASS BY SPRAY FORCE</th>
<th>MAXIMUM FLOW RATE (GPM)</th>
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</tr>
<tr>
<td>Product Class 3 (&gt; 8.0 ounces-force)</td>
<td>1.28</td>
</tr>
</tbody>
</table>

For SI units: 1 gallon per minute = 3.785 L/min, 1 ounce-force = 28.3495 grams-force

**SUBSTANTIATION:**
This public comment addresses the issue of listing requirements in the notes portion of Table 402.1 (Maximum Fixture and Fixture Fittings Flow Rates) and updates the maximum flow rate for commercial pre-rinse spray valves. All remaining footnotes have been updated in response to these changes. Additionally, reference has been made in new note (3) to Section 402.11 (Commercial Pre-rinse Spray Valves) for maximum flow rates based on product class and spray force.
Proposals

Item #: 051
WEStand 2023  Section: 406.3, Table 1201.1

SUBMITTER: Billy Smith  
Chair, WE-Stand Technical Committee

RECOMMENDATION:
Revise text

406.0 Water Softeners and Treatment Devices.

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 comply be listed in accordance with NSF/ANSI 58 and ASSE 1086.

| TABLE 1201.1 |
|-----------------|-----------------|-----------------|
| **STANDARD NUMBER-YEAR** | **STANDARD TITLE** | **REFERENCED SECTION** |

(portion of table not shown remains unchanged)

Note: ASSE 1086 and NSF/ANSI 58 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
Section 406.3 is being revised to include reference to ASSE 1086 as this standard covers water efficiency, automatic shut-off valves, and flow restrictor requirements for residential RO systems. Also covered is performance testing to address the membrane life concerns of high efficiency RO membranes.

Additionally, this standard includes testing requirements for complete systems or components (RO membrane, automatic shut off valve, flow restrictor, etc.). It should be noted that NSF/ANSI 58 does not overlap or conflict with ASSE 1086 as it focuses on the testing protocols associated with the reduction of chemicals through RO technology.

ASSE 1086 however, focuses on the treatment technology and ensuring that efficiency does not compromise membrane life. The revised language also clarifies that automatic shutoff valves are required for RO systems installed in residential occupancies. Lastly, similar language was accepted by the UPC Technical Committee for Item #300.

COMMITTEE ACTION: REJECT
COMMITTEE STATEMENT:
The proposed revisions to Section 406.3 limit the application of provisions to reverse osmosis (RO) water treatment systems used in residential occupancies. The existing language is sufficient as it applies to both residential and commercial applications. As stated in the provided substantiation, ASSE 1086 is specific to residential RO systems, and the language should make this distinction without revising the intent and applicability of the entire section.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 28 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:

BARNES: It is redundant to require that a system be listed to both standards, NSF/ANSI 58 and ASSE 1086. In order for a product to be listed to ASSE 1086 it must meet all of the requirements of NSF/ANSI 58. Listing to both standards would be redundant and would only serve to drive revenue to the certification bodies, of which we are one. Secondly, ASSE 1086 is not yet supported by the industry. Currently none of the accredited certification bodies in North America have any products listed to this standard.

KENDZEL: I support the comments submitted by Samantha Barnes. Duplication or redundant requirements covered in separate standards only leads to confusion in the marketplace and also increased costs to manufacturers for unneeded duplicate certifications.

KLEIN: Reflecting on Kent Sovocool and Samantha Barnes' comments, the proposal has two issues, one about redundancy, the other about automatic shut off in non-residential occupancies. Both need to be fixed in public comment.

SOVOCOOL: In my recollection, the negative commenters' statements are not the reason the group appropriately killed this. It was the attempt to effectively remove the auto shutoff requirement for non-residential. That would have been detrimental to the water conservation value of the standard.

Appended Comments

PUBLIC COMMENT 1

Item #: 051

Code Year: 2023 WEStand Section #: 220.0

SUBMITTER: Chelsea Salaiz Self

RECOMMENDATION: Accept as Modified

Request to replace the code change proposal by this public comment.

220.0 - R - Reverse Osmosis (RO). A water purification process utilizing a semi-permeable membrane under pressure to remove ions, contaminants, and undesired molecules.

SUBSTANTIATION:
The WEStand contains provisions for reverse osmosis systems but does not currently define what reverse osmosis is. The proposed language describes that RO is a water purification process that utilizes a semi-permeable membrane. Inclusion of this description within the WEStand gives users a better understanding of the RO process and its applicability within the standard.
PUBLIC COMMENT 2

Code Year: 2023 WEStand  Section #: 220.0  Item #: 051
SUBMITTER: Monte Myers  Self  Comment #: 2

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

220.0  - R -
Reverse Osmosis (RO). A filtration process which demineralizes or deionizes water by means of passing the water through a semi-permeable membrane.

SUBSTANTIATION:
This definition offers a simplified description of the reverse osmosis process. In simple terms, this process filters water by means of a semi-permeable membrane. RO is considered widely to be the most effective means of water filtration as it removes contaminants when pressure forced through this semipermeable membrane. As water flows from the more concentrated side of the membrane to the less concentrated side, these contaminants are removed and blocked from entering the less concentrated side. Since the goal of the WEStand is to "optimize water use practices," this proposed definition contributes to the development of a more comprehensive document for adoption.

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PUBLIC COMMENT 3

Code Year: 2023 WEStand  Section #: 406.3, Table 1201.1  Item #: 051
SUBMITTER: Monte Myers  Self  Comment #: 3

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

406.0 Water Softeners and Treatment Devices.

406.3 Point-of-Use Reverse Osmosis Water Treatment Systems. Reverse osmosis (RO) water treatment systems shall comply with NSF/ANSI 58 and 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 comply with NSF 58. Residential RO systems shall also comply with ASSE 1086.

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSE 1086-2022*</td>
<td>Performance Requirements for Reverse Osmosis Water Efficiency – Drinking Water</td>
<td>406.3</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: ASSE 1086 and NSF/ANSI 58 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.
SUBSTANTIATION:
Section 406.3 (Point-of-Use Reverse Osmosis Water Treatment Systems) is being modified to avoid limitations on provisions for reverse osmosis water treatment systems. ASSE 1086 only applies to residential RO systems, and this modified language includes that distinction.

Additionally, NSF/ANSI 58 and ASSE 1086 do not overlap. As noted in the substantiation provided with the proposal, NSF/ANSI 58 focuses on the testing protocols associated with the reduction of chemicals through RO technology, and ASSE 1086 focuses on the treatment technology and ensuring that efficiency does not compromise membrane life. It is not redundant to require compliance with both standards as they complement one another. ASSE 1086 aligns with the scope of the WEStand in that it reduces the volume of water being wasted by improving membrane efficiency. Therefore, it is still appropriate to include both standards within this section.

ASSE 1086 (Scope): This standard covers water efficiency, automatic shut-off valves, and flow restrictor requirements for residential RO systems and performance testing to address the membrane life concerns of high efficiency RO membranes. This standard includes test requirements for complete systems or components (RO membrane, automatic shut off valve, flow restrictor).

NSF/ANSI 58 (Scope): The purpose of this standard is to establish minimum requirements for materials, design and construction, and performance of reverse osmosis (RO) drinking water treatment systems. This standard also specifies the minimum product literature that manufacturers shall supply to authorized representatives and owners, as well as the minimum service-related obligations that manufacturers shall extend to system owners. The point-of-use (POU) RO drinking water treatment systems addressed by this standard are designed to be used for the reduction of specific substances that may be present in drinking water (public or private) considered to be microbiologically safe and of known quality.
Proposals

Item #: 052
WEStand 2023  Section: 407.3, Table 1201.1

SUBMITTER: Robert Pickering
Eastern Research Group, Inc.
EPA WaterSense

RECOMMENDATION:
Revise text

407.0 Commercial Food Service.

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

TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Star-2022</td>
<td>Program Requirements for Commercial Ovens</td>
<td>407.3</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: The Energy Star Program Requirements for Commercial Ovens meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
EPA's Energy Star program, in coordination with WaterSense, is incorporating water efficiency criteria into Version 3.0 of its specification for commercial ovens, which includes combination ovens. With the specification publishing April 12, 2022 and compliant products being available in the marketplace by the time of publication of 2023 WE-Stand, EPA suggests aligning water efficiency criteria with the new Energy Star specification.

ENERGY STAR® Program Requirements for Commercial Ovens:

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal lacks technical substantiation to justify the proposed change. Furthermore, this proposal removes specific water efficiency criteria required for combination ovens.
TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 28 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:

OSANN: The latest Energy Star Specification for Commercial Ovens (Version 3.0) covers more types of ovens and appears to be as rigorous, if not more so, than the current WE•Stand language. Section 407.3 should be reworked in public comment to encompass all water-using commercial ovens that are within the scope of the Energy Star specification.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand Section #: 407.3, Table 1201.1 Item #: 052

SUBMITTER: Robert Pickering
Eastern Research Group, Inc.
EPA WaterSense

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

407.0 Commercial Food Service.

407.3 Combination Ovens. Combination ovens shall not use water in the convection mode except when utilizing a moisture nozzle for food products in the oven. The total amount of water used by the moisture nozzle in the convection mode shall not exceed a half a gallon per hour per oven cavity. When operating in the steamer mode, combination ovens shall not use more than 1.5 gallons (5.7 L) per hour per pan. In accordance with the Energy Star program requirements, the water consumption rate shall not exceed 0.4 gallons (1.5 L) per pan when in convection mode and shall not exceed 0.5 gallons (1.9 L) per pan when in steamer mode. The pan capacity shall be in accordance with ASTM F1495.

<table>
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<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM F1495-2020*</td>
<td>Standard Specification for Combination Oven Electric or Gas Fired</td>
<td>407.3</td>
</tr>
<tr>
<td>Energy Star-2022</td>
<td>Program Requirements for Commercial Ovens</td>
<td>407.3</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: ASTM F1495 and the Energy Star Program Requirements for Commercial Ovens meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
ENERGY STAR incorporated water efficiency criteria for combination ovens within Version 3.0 of the ENERGY STAR Product Specification for Commercial Ovens, published in April 2022. Prior versions of the specification did not address water efficiency. Within Version 3.0, ENERGY STAR developed the water efficiency criteria in coordination with EPA's WaterSense program. The specification takes effect on January 12, 2023, although products are able to pursue early certification prior to that date.
The specification requires that combination ovens have a maximum water consumption of 0.5 gallons per pan (gal/pan) when in steamer mode and 0.4 gallons per pan (gal/pan) when in convection mode. To determine these thresholds, ENERGY STAR and WaterSense reviewed the existing marketplace for combination ovens, including qualified product listings from ENERGY STAR and the California Foodservice Instant Rebates. The criteria selected would reduce allowable water consumption within the steamer mode currently included by WE•Stand by 67%, while also aligning with a well-known and prominent EPA labeling program. According to the 2021 ENERGY STAR Unit Shipment and Market Penetration Report, ENERGY STAR certified models of commercial ovens represented 53% of the marketplace. Therefore, there is availability of many models from a variety of manufacturers meeting the Version 3.0 specification.

The gallons per pan (gal/pan) metric for evaluating water consumption within the ENERGY STAR specification is different from the gallons per hour per pan (gal/hr/pan) metric currently used in WE•Stand. During the specification revision process, some manufacturers expressed that establishing a gallon per hour per pan (gal/hr/pan) criteria would inadvertently disadvantage ovens with higher production rates that have shorter cook times. Expressing the water consumption value in gallons per hour per pan (gal/hr/pan) during cooking periods could therefore potentially be misleading for some models and may reflect negatively on some high energy and water efficient ovens with high throughput. Multiple stakeholders suggested that EPA instead use gallons per pan (gal/pan) as an alternative to express the water consumption value during combination oven cooking periods for both steam and convection modes to avoid any displacement of high energy and water efficient combination ovens with high production capacities.

WE•Stand has historically included reference to EPA's labeling programs, including WaterSense and ENERGY STAR, when establishing water efficiency criteria for applicable product categories. For combination ovens, now that ENERGY STAR adequately addresses water efficiency in addition to energy efficiency, EPA similarly suggests aligning to the criteria within the new ENERGY STAR specification.
Proposals

Item #: 053
WES tand 2023  Section: 408.3

SUBMITTER: Billy Smith
Chair, W E-Stand Technical Committee

RECOMMENDATION:
Add new text

408.0 Medical and Laboratory Facilities.

408.3 Steam Sterilizers. Controls shall be installed to limit the discharge temperature of condensate or water from steam sterilizers to 140°F (60°C) or less. A venturi-type vacuum system shall not be utilized with vacuum sterilizers.

SUBSTANTIATION:
Steam sterilizers are an essential part of the decontamination and sterilization process performed by sterile processing departments in healthcare facilities. Of all the methods available for sterilization, heat in the form of saturated steam under pressure is the most widely used and the most dependable. For this reason, the proposed addition is best suited under Section 408.0. The proposed language is also consistent with the plumbing code.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed new requirements for steam sterilizers do not address water efficiency and conservation. The presented requirements pertain to discharge temperature limits and do not offer a benefit that aligns with the purpose of this standard. Such language is better suited within the plumbing code.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS:  AFFIRMATIVE: 22  NEGATIVE: 6  NOT RETURNED: 2  CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:
KENDZEL: I agree with the committee decision to reject; however, it would appear that through public comment, revisions can be made to the proposal to address some of the concerns and better clarify the intent.

KLEIN: The proposal needs to be amended to be more clear about the water efficiency benefits of the two provisions. It appears that both are related running water down the drain to cool heated discharge water. Section 407.6 talks about not using potable water to cool discharges in food service. Is something like that also relevant for Section 407.7?

EXPLANATION OF NEGATIVE:
ALLEN: I agree with Kent Sovocool's comment.

KOELLER: The so-called "substantiation" offered by the committee for rejection is FALSE. By controlling the temperature of water waste and prohibiting a venturi-type vacuum system DOES provide a water efficiency benefit. It appears that the committee again acted in haste to reject a legitimate proposal.
LENGER: The proposal has merit.

PAPE: The proposal only needs to add language that the purpose is to avoid tempering water at discharge.

PREMER: I agree with Kent Sovocool as well. Venturis by definition work in this manner.

SOVOCOOL: Agree with John Koeller. To add further detail on his second point, the venturi requires a constantly running source due to the physics of how a venturi vacuum works. This should not have not been rejected.

Public Comment 1

SUBMITTER: Jazmin Curiel
Self

RECOMMENDATION:
Accept as Submitted

Request to accept the code change proposal as submitted by this public comment.

SUBSTANTIATION:
The addition of Section 408.3 (Steam Sterilizers) does indeed provide a water efficiency benefit. Venturi-type vacuum systems have few moving parts and require a constant flow to operate. This directly relates to water consumption over the lifetime of the system. This language was originally published in IAPMO's Green Plumbing & Mechanical Code Supplement and is now verbatim with the plumbing code.

Public Comment 2

SUBMITTER: Chelsea Salaiz
Self

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

408.0 Medical and Laboratory Facilities.

408.3 Steam Sterilizers. Controls shall be installed to limit the discharge temperature of condensate or water from steam sterilizers to 140°F (60°C) or less. The discharge waste from steam sterilizers shall not be tempered with potable water. A venturi-type vacuum system shall not be utilized with vacuum sterilizers.

SUBSTANTIATION:
Not only should venti-type vacuum systems be prohibited based on their method of operation or function, but language should also be added to prohibit tempering water that is discharged from the steam sterilizer. Both of these requirements offer needed water efficiency benefits and belong in the WEStand.
Proposals

Item #: 055
WEStand 2023  Section: 409.1

SUBMITTER: Billy Smith
Chair, WE-Stand Technical Committee

RECOMMENDATION:
Revise text

409.0 Leak Detection and Control.
409.1 General. Where installed, leak detection and control devices shall comply with IAPMO IGC115 or IAPMO IGC 349 or ANSI/CAN/IAPMO Z1349. Leak detection and control devices shall not be installed where they isolate fire sprinkler systems.

Note: ANSI/CAN/IAPMO Z1349 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
As stated in the preface of the standard, IAPMO Z1349 supersedes IAPMO IGC 115 (Automatic Water Leak Detection Devices) and IAPMO IGC 349 (Electronic Plumbing Supply System Integrity Protection Devices). IAPMO Z1349 is an American National Standard covering devices for detection, monitoring, and control of water supply and distribution systems in commercial and residential applications. This standard also specifies requirements for materials, performance testing, environmental limitations, installation, and markings. Furthermore, this change is consistent with the plumbing code.

COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC

409.0 Leak Detection and Control.
409.1 General. Where installed, leak detection and control devices shall comply with IAPMO IGC 115, IAPMO IGC 349, or ANSI/CAN/IAPMO Z1349. Leak detection and control devices shall not be installed where they isolate fire sprinkler-protection systems.

COMMITTEE STATEMENT:
The proposal is being revised to keep reference to IAPMO IGC 349 and IAPMO IGC 115. There is a concern with the availability of leak detection and control devices currently listed to ANSI/CAN/IAPMO Z1349, and therefore the Technical Committee prefers the inclusion of all three standards within Section 409.1. Additionally, the term "sprinkler" is being modified to "protection" based on the action taken for Item #054.

TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS: AFFIRMATIVE: 17  NEGATIVE: 11  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Note: Item # 055 failed to achieve the necessary two-thirds affirmative vote of returned ballots. In accordance with Section 6.8.2 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard, a public comment is requested for this proposal. The Technical Committee will reconsider this proposal as a public comment.
EXPLANATION OF AFFIRMATIVE:

THOMPSON: It can take several years for manufacturers and third party certifiers to shift the listing of products to a newer standard like IAPMO Z1349. The committee’s amendment to include all the applicable standards in this proposal provides the most viable option for this situation type. Where the code is developed on a 3-year cycle and the new standard has recently been published. Since it will provide the best direction to users of the code. The term "isolate" is in the current text of the WE•Stand and there is no suggestion to change or alter this part of the text in this proposal. I don't see the benefits of rejecting the proposal based on this concern as it is not part of the proposed change.

EXPLANATION OF NEGATIVE:

BARNES: I agree with the comments made by the Southern Nevada Water Authority (Kent Sovocool) and the American Supply Association (Jim Kendzel).

KENDZEL: I am concerned about the comments made by Kent Sovocool related to lack of industry participation in the development of the standard. Until there can be verification that there was significant participation from the manufacturers currently in the marketplace, I will not be able to support this proposal.

KLEIN: I agree with Thomas Pape.

KOELLER: I am concerned over the observation made by Mr. Kent Sovocool and am changing my vote.

LANDO: I agree with Thomas Pape's comments.

LANSING: I agree with Thomas Pape's comments.

LENGER: Agree with Thomas Pape.

MCLEOD: I agree with the American Supply Association (Jim Kendzel) and the Southern Nevada Water Authority (Kent Sovocool).

PAPE: The term "isolate" is not clear. It would be clearer to say the device shall not be installed where it could restrict the flow. Also, I usually hear this referred to as fire SUPPRESSION system, rather than fire protection systems.

PREMER: I am in agreement with Thomas Pape.

SOVOCOOL: Almost no product is labeled yet for that very new IAPMO Z1349 standard. My opinion is that one manufacturer dominated the development of that standard and happens to have the only product that aligns with it. This is just too early in the development of leak detection devices to be used in this way.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 409.1

SUBMITTER: Jim Majerowicz
Plumbers Local Union 130 U.A.

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

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, or ANSI/CAN/IAPMO Z1349. Leak detection with control devices shall not be installed where they isolate restrict flow to fire protection suppression systems.
Note: ANSI/CAN/IAPMO Z1349 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The inclusion of all three standards seems appropriate as it gives the most viable options for leak detection and control devices without restricting to a single standard. ANSI/CAN/IAPMO Z1349 has recently been published and by the next code cycle, the other standards which it supersedes can be removed. Since there are already two manufacturers currently listing to ANSI/CAN/IAPMO Z1349, this standard should not be excluded from the list. The middle ground can be met by referencing all three. Furthermore, the remaining language in Section 409.1 (General) is being revised for clarity and use of common industry terms.

The scope of ANSI/CAN/IAPMO Z1349 is as follows: "This standard covers devices for detection, monitoring or control of water supply and distribution systems in sizes DN 8 to DN 300 (NPS-1/4 to NPS-12) for commercial and residential applications and specifies requirements for materials, performance testing, environmental limitations, installation, and markings."
Proposals

Item #: 057
WEStand 2023  Section: 412.4 - 412.5.2

SUBMITTER: Jazmin Curiel
Self

RECOMMENDATION:
Revise text

412.0 HVAC Water Efficiency.

412.4 Evaporative Cooler Water Use. Evaporative cooling systems (also known as swamp coolers) shall use less than 3.5 gallons (13.2 L) of water per ton-hour of cooling when system controls are set to maximum water use. Water use, expressed in maximum gallon water use per ton-hour of cooling, shall be marked on the device and included in product user manuals, product information literature, and manufacturer's installation instructions. Water use information shall be readily available at the time of code compliance inspection.

412.4.1 Overflow Alarm. Cooling systems shall be equipped with an overflow alarm to alert building owners, tenants, or maintenance personnel when the water refill valve continues to allow water to flow into the reservoir when the reservoir is already-full. The alarm shall have a minimum sound pressure level rating of 85 dBA measured at a distance of ten feet (3048 mm).

412.4.2 Automatic Pump Shut-Off. Cooling systems shall automatically cease pumping water to the evaporation pads when airflow across evaporation pads ceases.

412.4.3 Cooler Reservoir Discharge. A water quality management system (either timer or water quality sensor) is required. Where timers are used, the time interval between discharge of reservoir water shall be set to 6 hours or greater of cooler operation. Where water quality sensors are used, the discharge of reservoir water shall be set for greater 800 ppm or greater of Total Dissolved Solids (TDS). Continuous discharge or continuous bleed systems are prohibited.

412.4.4 Discharge Water Reuse. Discharge water shall be reused where appropriate applications exist on site. Where a nonpotable water source system exists on site, evaporative cooler discharge water shall be collected and discharged to the collection system. Exception: Where the reservoir water adversely affects the quality of the nonpotable water supply making the nonpotable water unusable for its intended purposes.

412.4.5 Discharge Water to Drain. Where discharge water is not recovered for reuse, the sump overflow line shall not be directly connected to a drain. Where the discharge water is put into a sanitary drain, a minimum 6 inch (152 mm) air gap is required between the termination of the discharge line and the drain opening. The discharge line shall terminate in a location that is readily visible to the building owner, tenants, or maintenance personnel.

412.5 Use of Reclaimed (Recycled) and On-Site Treated Nonpotable Water for Cooling. (remaining text unchanged)

412.5.1 Drift Eliminator. A drift eliminator shall be utilized in a cooling system, utilizing alternate sources of water, where the aerosolized water may come in contact with employees or members of the public.

412.5.2 Disinfection. A biocide shall be used to treat the cooling system recirculation water where the recycled water may come in contact with employees or members of the public.

SUBSTANTIATION:
The above sections are being revised to correlate with the mechanical code. Additionally, the proposed revisions are necessary to prevent the use of nonmandatory language in the body of the WE•Stand.
COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed revisions use poor code language and do not improve existing requirements. In particular, the phrase "capable of coming in contact with employees" is unenforceable. Furthermore, the additional reference to the "manufacturer's installation instructions" is repetitive and unnecessary as compliance is already addressed within the general requirements of the standard.

TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS: AFFIRMATIVE: 28 NOT RETURNED: 2 CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1
Code Year: 2023 WEStand Section #: 412.4, 412.4.1, 412.4.3 - 412.5.2 Item #: 057
SUBMITTER: Jazmin Curiel Self Comment #: 1
RECOMMENDATION: Accept as Modified

Request to replace the code change proposal by this public comment.

412.0 HVAC Water Efficiency.

412.4 Evaporative Cooler Water Use. Evaporative cooling systems (also known as swamp coolers) shall use less than 3.5 gallons (13.2 L) of water per ton-hour of cooling when system controls are set to maximum water use. Water use, expressed in maximum water use per ton-hour of cooling, shall be marked on the device and included in product user manuals, and product information literature, and installation instructions. Water use information shall be readily available at the time of code compliance inspection.

412.4.1 Overflow Alarm. Cooling systems shall be equipped with an overflow alarm to alert building owners, tenants, or maintenance personnel when the water refill valve continues to allow water to flow into the reservoir when the reservoir is already full. The alarm shall have a minimum sound pressure level rating of 85 dBA measured at a distance of ten feet (3048 mm).

412.4.3 Cooler Reservoir Discharge. A water quality management system (either timer or water quality sensor) shall be provided. Where timers are used, the time interval between discharge of reservoir water shall be set to 6 hours or greater of cooler operation. Where water quality sensors are used, the discharge of reservoir water shall be set for greater to 800 ppm or greater more of Total Dissolved Solids (TDS). Continuous discharge or continuous bleed systems are prohibited shall be prohibited.

412.4.4 Discharge Water Reuse. Discharge water shall be reused where appropriate applications exist on site. Where a nonpotable water source system exists on site, evaporative cooler discharge water shall be collected and discharged to such the collection system.

Exception: Where the reservoir water adversely affects the quality of the nonpotable water supply making the nonpotable water unusable for its intended purposes.

412.4.5 Discharge Water to Drain. Where discharge water is not recovered for reuse, the sump overflow line shall not be directly connected to a drain. Where the discharge water is put released into a sanitary drain, a minimum 6 inch (152 mm) air gap is required between the termination of the discharge line and the drain opening. The discharge line shall terminate in a location that is readily visible to the building owner, tenants, or maintenance personnel.

412.5 Use of Reclaimed (Recycled) and On-Site Treated Nonpotable Water for Cooling. (remaining text unchanged)

412.5.1 Drift Eliminator. A drift eliminator shall be utilized in a cooling system, utilizing alternate sources of water, where the aerosolized water may come in contact with employees or members of the public.

412.5.2 Disinfection. A biocide shall be used to treat the cooling system recirculation water where the recycled water may come in contact with employees or members of the public.
The revisions to Section 412.4 (Evaporative Cooler Water Use) and corresponding subsections are needed for enforceability and compliance with the technical style of IAPMO codes and standards.

For example, in Section 412.4.3 (Cooler Reservoir Discharge) the phrase "is required" should read "shall be provided," and the phrase "are prohibited" should read "shall be prohibited." This is consistent with IAPMO's Manual of Style which states that the term "shall" is to be used to indicate all requirements as this form is suitable for mandatory reference by another standard or code or adoption into law. Following this, use of the word "may" should not be used in the mandatory body of the standard either.

Furthermore, the requirement for quality sensors was reworked to avoid confusion. The phrase "set for greater 800 ppm or greater of Total Dissolved Solids" was rephrased to read "set to 800 ppm or more of Total Dissolved Solids."

Other revisions have been made to in response to the committee statement provided to remove the phrase "manufacturer's installation instructions" in Section 412.4 (Evaporative Cooler Water Use) and to avoid the phrase "capable of coming in contact" in Section 412.5.1 (Drift Eliminator) and Section 412.5.2 (Disinfection).
Item #: 059

WEStand 2023  Section: 214.0, 415.0 - 415.3, 415.20

SUBMITTER: Thomas Pape
Chair, WE-Stand Water Efficient Landscaping Task Group

RECOMMENDATION:
Revise text

415.0 **Sustainable Landscape Design and Installation - Irrigation Systems.**

415.1 General. Where landscape irrigation systems are installed, they **Vegetated landscapes greater than 500 square feet (ft²) (46.5 m²)** shall comply with Sections 415.2 through 415.16. **Vegetated roofs shall be in accordance with Section 415.20.**

415.1.1 Irrigation Design and Installation. The Authority Having Jurisdiction shall have the authority to require landscape irrigation contractors, installers, or designers to demonstrate competency. The system shall be designed and record drawings showing changes during installation shall be made available for the owner and for any required inspections. Where required by the Authority Having Jurisdiction, the contractor, installer, or designer shall be licensed, certified, or both to perform such work.

415.2 Required Documentation. The following documents shall be provided to the owner and shall be readily accessible onsite to the Authority Having Jurisdiction at the time of inspection:

1. The landscape plan and irrigation design as approved.
2. Drawings and records showing any changes during installation.
3. The report of the irrigation audit required by Section 415.19.
4. Irrigation controller information required by Section 415.8.1.

415.3 Qualifications. Where permits are required, the Authority Having Jurisdiction shall have the authority to require contractors, installers, or service technicians to demonstrate competency. Where determined by the Authority Having Jurisdiction, the irrigation contractor, installer, or service technician shall be approved to perform such work.

(renumber remaining sections)

415.2.1415.20 **Vegetative Roofs and Walls.** (remaining text unchanged)

214.0 - L -

**Landscape.** That portion of a lot not covered by the footprint of a building or any hardscape including driveways, sidewalks, decks, patios, swimming pools, or spas.

**Landscape, Vegetated.** That portion of a landscape in which living plant material and porous landscape elements are installed or maintained, or is prepared for the installation of such material, not including vegetated roofs or undisturbed native vegetation maintained without supplemental irrigation.

SUBSTANTIATION:
The title of Section 415.0 is being updated to better reflect the provisions covered. The section is also being updated to clarify that requirements are only applicable to vegetated landscapes greater than 500 square feet to prevent these provisions from being applied where they would offer insignificant benefits. Since vegetated roofs and walls are not considered part of the landscape area, the section is being moved to a more appropriate location. Additionally, definitions for “landscape” and “vegetated landscape” have been proposed to support the updated requirements. The provided terminology is clear and necessary for inclusion.
**COMMITTEE ACTION:** ACCEPT AS AMENDED BY THE TC

**415.0 Sustainable Landscape Design and Installation.**

**415.1 General.** Vegetated landscapes greater than 500 square feet (ft²) (46.5 m²) shall comply with Section 415.2 through Section 415.19. Vegetated roofs shall be in accordance with Section 415.20.

**415.2 Required Documentation.** The following documents shall be provided to the owner and shall be readily accessible onsite to the Authority Having Jurisdiction at the time of inspection:

1. The landscape plan and irrigation design as approved.
2. Drawings and records showing any changes during installation.
3. The report of the irrigation audit required by Section 415.19.
4. Irrigation controller information required by Section 415.8.1.

**415.3 Qualifications.** Where permits are required, the Authority Having Jurisdiction shall have the authority to require contractors, installers, or service technicians to demonstrate competency. Where determined by the Authority Having Jurisdiction, the irrigation contractor, installer, or service technician shall be approved to perform such work.

(renumber remaining sections)

**415.20 Vegetated Roofs and Walls.** Irrigation systems using potable water for vegetative roofs and walls are prohibited.

**214.0 - L -
Landscape.** That portion of a lot not covered by the footprint of a building or any hardscape including driveways, sidewalks, decks, patios, swimming pools, or spas.

**Landscape, Vegetated.** That portion of a landscape in which living plant material and porous landscape elements are installed or maintained, or is prepared for the installation of such material, not including vegetated roofs or undisturbed native vegetation maintained without supplemental irrigation.

**COMMITTEE STATEMENT:**
The title of Section 415.0 is being updated to remove the term “Sustainable” as it is not necessary for the description of the section and may be considered vague and unenforceable. As requested by the Technical Committee, Section 415.20 is shown for reference.

**TOTAL ELIGIBLE TO VOTE:** 30

**VOTING RESULTS:**

**AFFIRMATIVE:** 27  **ABSTAIN:** 1  **NOT RETURNED:** 2  **CRAWFORD, WILLIAMS**

**EXPLANATION OF ABSTAIN:**

**LANDO:** The proposal is dividing traditional landscape areas into "Landscape" and "Landscape, Vegetated" which I understand for the purpose of the WE•Stand. However, it is unclear as to where a permeable hardscape surface would fall under. I suggest that this is clarified during the public comment period.

FYI - The typical approach to city planning and stormwater management requirements are to make areas outside of the building envelope into permeable and non-permeable areas. The permeable areas are then further divided by living and non-living elements. My hope would be that future WE•Stand editions of this section could better align with what planning departments are already doing.

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**Appended Comments**

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**PUBLIC COMMENT 1**

**Code Year:** 2023 WEStand  
**Section #:** 214.0  
**Item #:** 059  
**SUBMITTER:** Thomas Pape  
Chair, WE-Stand Water Efficient Landscaping Task Group
RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

214.0 - L -
Landscape, Vegetated. That portion of a landscape in which living plant material, and porous landscape elements, and water features are installed or maintained, or is prepared for the installation of such material, not including vegetated roofs or undisturbed native vegetation maintained without supplemental irrigation.

SUBSTANTIATION:
This revision is needed to fully define the scope of the term “vegetated landscape.” It is important that the area of the vegetated landscape be unambiguously defined because the core requirements for landscape water efficiency in Section 415.4 (Plant and Irrigation System Limitations) apply to percentages of the vegetated landscape (i.e., plants not requiring supplemental irrigation shall comprise not less than 60% of the vegetated landscape, and an irrigation system shall not be installed to serve more than 40% of the vegetated landscape).

The 2020 edition of the WESStand includes the same percentage-based limitations but applies them to an undefined term, “landscaped area,” which rendered the requirement largely unenforceable. The removal of this ambiguity was one of the primary objectives of the Task Group, and the inclusion of water features closes the missing link in the area covered by the percentage requirement. It is appropriate to include water features in the calculations for determining the portion of the landscape that is subject to these requirements because in many cases the evaporative losses per square foot from a water feature are comparable to the ET losses from turf. With this clarification, the requirements in Section 415.4 (Plant and Irrigation System Limitations) will bring all high water use areas in the landscape under the same limitation.
Proposals

Item #: 060

WEStand 2023  Section: 415.2, 415.4 - 415.4.3, Table 1201.1

SUBMITTER: Thomas Pape
Chair, WE-Stand Water Efficient Landscaping Task Group

RECOMMENDATION:
Revise text

415.2415.4 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 supplemental irrigation shall be used in comprise no less than 60 percent of the vegetated landscape that is not principally used as an athletic field or public recreation site. An irrigation system shall not be installed to serve more than 40 percent of the vegetated landscaped area.

Exceptions:

a. Where average annual rainfall is less than 12 inches (305 mm) and in climate zones landscape areas where the plant materials have an annual ETc of not exceeding 15 inches (381 mm), an in-ground irrigation system shall be allowed to be installed in 80 percent of the vegetated landscape;
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. Where only onsite alternate water sources in accordance with Chapters 6, 7, 8, or 9 are used for irrigation;
c. Drip irrigation and microspray systems are not considered inground systems.

415.4.1 Noxious Plants. Nuisance, invasive and noxious plants as defined by the Authority Having Jurisdiction shall not be installed in the landscape.

415.4.2 Athletic Fields. Athletic fields shall be irrigated with either reclaimed (recycled) or onsite alternate water sources provided in accordance with Chapters 6, 7, 8, or 9. Golf courses shall be planted in landscaping which does not require supplemental irrigation except for tees, fairways, and greens. The use of potable water on newly installed athletic fields shall be permitted for a period of not more than 18 months after installation or as approved by the Authority Having Jurisdiction.

415.4.3 Plant Grouping. Plants shall be grouped into hydrozones based on water use classifications. Irrigation systems shall be designed to provide water requirements to hydrozones as specified by the water use classification of the plant species. Minimum plant water demands shall be determined in accordance with ANSI/ASABE S623.1.

TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI/ASABE S623.1-2017*</td>
<td>Determining Landscape Plant Water Demands</td>
<td>415.4.3</td>
</tr>
</tbody>
</table>

Note: ANSI/ASABE S623.1 meets the requirements for a consensus referenced standard in accordance with Section 15.2 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
Section 415.4 (Plant and Irrigation System Limitations) is being revised to include additional relevant subsections pertaining to noxious plants, athletic fields, and plant grouping. All of these topics should be addressed within the specified plant and irrigation system limitations.
Although noxious plant provisions are more aligned with environmental site benefits, such language is necessary for designing landscapes and complying with local jurisdictions as these plants may be invasive and toxic. In some cases, noxious plants may crowd out native vegetation. In any case, the requirements vary by geographical setting.

Section 415.4.2 (Athletic Fields) is being added to ensure that irrigation is focused on actual playing surfaces. The language pertaining to newly installed athletic fields and the landscape establishment phase is needed as potable water may be required to flush out salts within the soil.

Section (415.4.3 Plant Grouping) is needed for grouping of plants into hydrozones based on water classifications. Such plant grouping conserves water used for irrigation and promotes healthier vegetation. In support of this, ANSI/ASABE S623.1 is referenced as it provides the methodology for determining the minimum plant water demands used for such grouping.

COMMITEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 28 NOT RETURNED: 2 CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEstand Section #: 207.0, 220.0

SUBMITTER: Adam Segura Self

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

207.0 - E -
Evapotranspiration (ET). The water transpired from vegetation, evaporated from the soil, water, and plant surfaces. Evapotranspiration rates are values expressed in inches per unit of time (day, week, month, or year). Evapotranspiration rates vary by components of weather conditions, including insolation, humidity, temperatures and wind, and time of year.

ETc. Evapotranspiration rate (in/hr) of the plants derived by multiplying ETo by the appropriate plant factor or coefficient.

ETo. Reference evapotranspiration rate (in/hr) for a cool-season grass as calculated by the standardized Penman-Monteith equation based on weather-station data. Common sources for obtaining local reference evapotranspiration rates are local agriculture extension services, state departments of agriculture, water agencies, irrigation professionals, the United States Geological Survey, and internet websites.

220.0 - R -
Reference Evapotranspiration (ETo). Numeric value, expressed in inches/hr., calculated as the water necessary to produce maximum biomass based upon a cool-season turf grass 4-6 inches tall. Common sources for obtaining local reference evapotranspiration rates are local agriculture extension services, state departments of agriculture, water agencies, irrigation professionals, the United States Geological Survey, and internet websites.

SUBSTANTIATION:
There currently exists two varying definitions for “reference evapotranspiration (ETo)” in Chapter 2 (Definitions). To mitigate this, the provided terminology for “ETo” offers a combination of the two and removes the duplicate definition found in Section 220.0 (R). The key difference between the two definitions is the language referencing the method of calculation. The Food and Agriculture Organization uses the Penman-Monteith equation as the sole method for determining reference evapotranspiration rates as it has a strong likelihood for correct predictions over a wide range of locations and climates and has provisions for application in data-short situations. For this reason, the language referencing this calculation method was kept. Additionally, both ETc and ETo have been relocated and indented under the main description for ET.
Proposals

Item #: 062
WEStand 2023  Section: 415.4, Table 1201.1

SUBMITTER: Jazmin Curiel
Self

RECOMMENDATION:
Revise text

415.0 Landscape Irrigation Systems.

415.4 Backflow Protection. Potable water and reclaimed water supplies to lawn sprinklers and landscape irrigation systems, having no pumps or connections for pumping equipment and no chemical injection or provisions for chemical injection, shall be protected from backflow in accordance with the plumbing code and Authority Having Jurisdiction by one of the following devices:
(1) Atmospheric vacuum breaker (AVB)
(2) Pressure vacuum breaker backflow prevention assembly (PVB)
(3) Spill-resistant pressure vacuum breaker (SVB)
(4) Reduced-pressure principle backflow prevention assembly (RP)
(5) A valve complying with IAPMO PS 72

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO PS 72-2019</td>
<td>Valves with Atmospheric Vacuum Breakers</td>
<td>415.4(5)</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: IAPMO PS 72 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
Section 415.4 is being updated to include a list of appropriate backflow prevention devices for protection of potable water and reclaimed water supplies to lawn sprinklers and landscape irrigation systems. The proposed list is consistent with the most recent revisions made to the plumbing code. The inclusion of IAPMO PS 72 is appropriate as it covers valves for cold water installations requiring an integral anti-siphon device to prevent house water contamination when installed per the manufacturer's instructions. Table 1201.1 has been revised to include this newly referenced standard.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The WE•Stand refers the user to the plumbing code for backflow prevention requirements. The plumbing code contains various backflow prevention methods along with applicable industry standards for compliance. Rather than simply providing a list of approved devices, the provisions of the plumbing code should be applied.
TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS: AFFIRMATIVE: 28 NOT RETURNED: 2 CRAWFORD, WILLIAMS

Appendixed Comments

PUBLIC COMMENT 1
Code Year: 2023 WEstand Section #: 415.6 Item #: 062
SUBMITTER: Chelsea Salaiz Self
RECOMMENDATION: Accept as Modified
Request to replace the code change proposal by this public comment.

415.0 Landscape Irrigation Systems.

415.6 Backflow Protection. Potable water and reclaimed water supplies to lawn sprinklers and landscape irrigation systems, having no pumps or connections for pumping equipment and no chemical injection or provisions for chemical injection, shall be protected from backflow in accordance with the plumbing code and Authority Having Jurisdiction.

SUBSTANTIATION:
Since the WEStand contains provisions for reclaimed water use for irrigation, revising the scope of this requirement to apply to both potable water and reclaimed water is appropriate. Also, the applicability of this section is limited to landscape irrigation systems including lawn sprinklers, and it is therefore necessary to make this distinction.

Although the committee prefers direct reference to the plumbing code rather than including a list of approved backflow prevention devices, Section 415.6 (Backflow Protection) should still be revised to incorporate the remaining language addressing chemical injection. Therefore, this public comment includes the revisions to Section 415.6 (Backflow Protection) regarding chemical injection and refers users to the plumbing code for the list of approved devices.

PUBLIC COMMENT 2
Code Year: 2023 WEstand Section #: 415.6, Table 1201.1 Item #: 062
SUBMITTER: Jim Majerowicz Plumbers Local Union 130 U.A.
RECOMMENDATION: Accept as Modified
Request to replace the code change proposal by this public comment.

415.0 Landscape Irrigation Systems.

415.6 Backflow Protection. Potable water and reclaimed water supplies to lawn sprinklers and landscape irrigation systems, having no pumps or connections for pumping equipment and no chemical injection or provisions for chemical injection, shall be protected from backflow in accordance with the plumbing code and Authority Having Jurisdiction.

by one of the following devices:
(1) Atmospheric vacuum breaker (AVB)
(2) Pressure vacuum breaker backflow prevention assembly (PVB)
(3) Spill-resistant pressure vacuum breaker (SVB)
(4) Reduced-pressure principle backflow prevention assembly (RP)
(5) A valve complying with IAPMO PS 72
(6) Other backflow protection devices, as permitted by the plumbing code
**TABLE 1201.1**
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>IAPMO PS 72-2019</td>
<td>Valves with Atmospheric Vacuum Breakers</td>
<td>415.6(5)</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

**Note:** IAPMO PS 72 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**SUBSTANTIATION:**
It is beneficial to provide users of the WEStand with a list of approved devices or requirements instead of constantly referring back to the plumbing code. In cases where such approved devices or requirements are fitting, it improves the standard's ability to serve as a comprehensive document for adoption. In attempts to meet this goal and also address the committee's reasoning for rejection, the list has been revised to also include item (6) which directs users of the standard to the plumbing code in the event installation of a different device is desired.

The inclusion of IAPMO PS 72 is appropriate as it covers valves with atmospheric vacuum breakers and specifies requirements for materials, physical characteristics, performance testing, and markings. Valves covered by this standard are intended for cold water installations requiring an integral anti-siphon device to prevent water contamination.
Item #: 064  WEStand 2023 Section: 415.6, 415.7, 415.10, Table 1201.1

SUBMITTER: Thomas Pape  Chair, WE-Stand Water Efficient Landscaping Task Group

RECOMMENDATION:
Revise text

415.6415.8 Irrigation Control Systems. Where installed as part of an landscape-irrigation system, irrigation control systems shall:
(1) Automatically adjust the irrigation schedule to respond to plant water needs determined by weather or soil moisture conditions—Be listed to the EPA WaterSense Specification for Weather-Based Irrigation Controllers or the EPA WaterSense Specification for Soil Moisture-Based Irrigation Controllers.
(2) Utilize on-site sensors, either integral or auxiliary, or remote weather data to inhibit or suspend irrigation when adequate soil moisture is present or during rainfall or freezing conditions.
(3) Utilize either one or more on-site sensors or a weather-based irrigation controller listed to the US EPA WaterSense Weather Based Irrigation Controllers Specification to suspend irrigation when adequate soil moisture is present for plant growth.
(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 water flowing off of the intended irrigation zone.
(5) Be capable of indicating to the user when it is not receiving a signal or local sensor input.
(6) Be capable of allowing for a manual operation troubleshooting test cycle and shall automatically return to sensor input mode within some period of time as designated by the manufacturer, even when the switch is still positioned for manual operation.
(7) 415.8.1 Posting of Settings. The site specific settings of the irrigation control system shall be posted at the control system location and be visible at the time of inspection. The posted data, where applicable to the settings of the controller, shall include:
(1) Precipitation rate for each zone.
(2) Plant evapotranspiration coefficients for each zone.
(3) Soil type and basic intake and infiltration rate for each zone.
(4) Rain sensor settings.
(5) Soil moisture setting.
(6) Peak demand schedule including run times for each zone and the number of cycles to mitigate runoff and monthly adjustments or percentage change from peak demand schedule.
415.7415.9 Irrigation Flow Sensing System. (remaining text unchanged)

(renumber remaining sections)

415.10415.12 System Performance Requirements. The landscape irrigation system shall be designed and installed to:
(1) Prevent irrigation water from runoff out of the irrigation zone.
(2) Prevent water in the supply-line drainage from draining out between irrigation events.
(3) Not allow irrigation water to be applied onto or enter non-targeted 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.
Exception: Landscape features outside of the public right of way such as paved walkways, jogging paths, and golf cart paths, are exempted from this requirement where run off drains into the same hydrozone without puddling.

(renumber remaining sections)
TABLE 1201.1
REFERENCED STANDARDS

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>EPA WaterSense-2021</td>
<td>Specification for Soil Moisture-Based Irrigation Controllers</td>
<td>415.8(1)</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: The EPA WaterSense Specifications for Weather-Based Irrigation Controllers and for Soil Moisture-Based Irrigation Controllers meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
Section 415.8 (Irrigation Control Systems) is being revised and separated for additional clarity on the application of provisions. The EPA WaterSense Specification for Weather-Based Irrigation Controllers establishes the performance and capability criteria and applies to standalone controllers, add-on devices, and plug-in devices that use current weather data as a basis for scheduling irrigation. The EPA WaterSense Specification for Soil Moisture-Based Irrigation Controllers establishes the criteria for soil moisture-based irrigation controllers and applies to stand-alone controllers, add-on devices, and plug-in devices that inhibit or allow an irrigation event based on reading from a soil moisture sensor mechanism. For these reasons, the proposed modifications are beneficial to the WE•Stand.

The EPA Specifications may be accessed via the following links:

COMMITTEE ACTION: ACCEPT AS SUBMITTED

415.8 Irrigation Control Systems. Where installed as part of an irrigation system, irrigation control systems shall:
(1) Be listed to the EPA WaterSense Specification for Weather-Based Irrigation Controllers or the EPA WaterSense Specification for Soil Moisture-Based Irrigation Controllers.
(2) Utilize on-site sensor(s), either integral or auxiliary, to inhibit or suspend irrigation during rainfall or freezing conditions.

415.8.1 Posting of Settings. The site specific settings of the irrigation control system shall be posted at the control system location and be visible at the time of inspection. The posted data, where applicable to the settings of the controller, shall include:
(1) Precipitation rate for each zone.
(2) Plant evapotranspiration coefficients for each zone.
(3) Soil type and infiltration rate for each zone.
(4) Rain sensor settings.
(5) Soil moisture setting.
(6) Peak demand schedule including run times for each zone and the number of cycles to mitigate runoff and monthly adjustments or percentage change from peak demand schedule.

415.9 Irrigation Flow Sensing System. (remaining text unchanged)

(renumber remaining sections)

415.12 System Performance Requirements. The irrigation system shall be designed and installed to:
(1) Prevent irrigation water from runoff out of the irrigation zone.
(2) Prevent water in the supply-line from draining out between irrigation events.
(3) Not allow irrigation water to be applied onto or enter non-targeted 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.

Exception: Landscape features outside of the public right of way such as paved walkways, jogging paths, and golf cart paths, are exempted from this requirement where run off drains into the same hydrozone without puddling.

(renumber remaining sections)
TABLE 1201.1
REFERENCED STANDARDS

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<td>Specification for Soil Moisture-Based Irrigation Controllers</td>
<td>415.8(1)</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

COMMITTEE STATEMENT:
An editorial revision has been made to Section 415.8(2) to indicate that either a single on-site sensor or multiple may be used as a means of control for an irrigation system.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 25 NEGATIVE: 3 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF NEGATIVE:

KLEIN: I concur with Markus Lenger. Also, apparently the TC had no issues with the reference to EPA WaterSense in this proposal, but we did in a previous one.

LANSING: I also concur with Markus Lenger. The proposal is overly restrictive.

LENGER: On-site sensor may have maintenance issues such as battery replacements etc. AI and other means can be as effective and should not be excluded.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand Section #: 415.8

SUBMITTER: Monte Myers
Self

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

415.0 Landscape Design and Installation.

415.8 Irrigation Control Systems. Where installed as part of an irrigation system, irrigation control systems shall:

(1) Be listed to comply with either the EPA WaterSense Specification for Weather-Based Irrigation Controllers or the EPA WaterSense Specification for Soil Moisture-Based Irrigation Controllers.

(2) Utilize on-site sensor(s), either integral or auxiliary, to inhibit or suspend irrigation during rainfall or freezing conditions.

SUBSTANTIATION:
The EPA WaterSense Specifications for Weather-Based Irrigation Controllers and Soil Moisture-Based Irrigation Controllers already require the use of sensors to control irrigation schedules. These specifications apply to stand-alone controllers, add-on devices, and plug-in devices that use either current weather data or soil moisture as a basis for scheduling irrigation. Item (2) is referring to specific weather conditions already monitored via controllers complying with item (1). By complying with item (1), you automatically comply with item (2). Therefore, the second item is redundant and should be removed.
415.0 Landscape Design and Installation.

415.8 Irrigation Control Systems. Where installed as part of an irrigation system, irrigation control systems shall:

(1) Be listed to the EPA WaterSense Specification for Weather-Based Irrigation Controllers or the EPA WaterSense Specification for Soil Moisture-Based Irrigation Controllers.

(2) Utilize on-site sensor(s), either integral or auxiliary, to inhibit or suspend irrigation during rainfall or freezing conditions.

SUBSTANTIATION:
The second requirement is overly restrictive and does not allow for other appropriate types of sensors to be used. As noted in the committee comments, onsite sensors may experience maintenance issues and there exists more advanced means of measuring data that are appropriate and effective that should not be excluded.
Proposals

Item #: 073
WESstand 2023 Section: 418.2, 418.4, Chapter 10, Table 1201.1

SUBMITTER: Emily Toto
ASHRAE

RECOMMENDATION:
Revise text

418.0 Swimming Pools, Spas, and Hot Tubs.

418.2 On and Off Switch – Pool Heaters. Pool, spa, and hot tub heaters shall be equipped with a readily accessible on and off switch to allow shutting off the heater without adjusting the thermostat setting. Pool heaters fired by natural gas shall not have continuously burning pilot lights. [ASHRAE 90.1:7.4.5.1]

418.4 Time Switches. Time switches shall be installed on swimming pool, spa, and hot tub heaters and pumps.
Exceptions:
(1) Where public health standards require 24-hour pump operation.
(2) Where pumps are required to operate solar and waste heat recovery pool heating systems. [ASHRAE 90.1:7.4.5.3]

1002.0 Recirculation Systems.
1002.1 Pump Operation.

1002.1.2 For Pumps Between Boilers and Storage Tanks – Circulating Pump Controls. When used to maintain storage tank water temperature, recirculating pumps shall be equipped with controls limiting operation to a period from the start of the heating cycle to a maximum of 5 minutes after the end of the heating cycle. [ASHRAE 90.1:7.4.4.4]

1002.3 Temperature Maintenance Controls. For other than low-rise residential buildings, systems designed to maintain usage temperatures in hot-water pipes, such as recirculating hot-water systems or heat trace, shall be equipped with automatic time switches or other controls that can be set to switch off the usage temperature maintenance system during extended periods when hot water is not required. [ASHRAE 90.1:7.4.4.2]

1004.0 Service Hot Water – Other Than Low-Rise Residential Buildings.

1004.2 New Buildings. Service water-heating systems and equipment shall comply with the requirements of this section as described in Section 1004.5 and Section 1004.6. [ASHRAE 90.1:7.4.4.1]

1004.3 Additions to Existing Buildings. Service water-heating systems and equipment shall comply with the requirements of this section and Section 1004.5 and Section 1004.6.
Exception: When the service water-heating to an addition is provided by existing service water-heating systems and equipment, such systems and equipment shall not be required to comply with this standard. However, any new systems or equipment installed must comply with specific requirements applicable to those systems and equipment. [ASHRAE 90.1:7.4.4.1.2]

1004.4 Alterations to Existing Buildings – Service Water-Heating Systems and Equipment. Building service water-heating equipment installed as a direct replacement for existing building service water-heating equipment shall comply with the requirements of Section 1004.0 applicable to the equipment being replaced. New and replacement piping shall comply with Section 1005.2 and Section 1005.3.
Exception: Compliance shall not be required where there is insufficient space or access to meet these requirements. [ASHRAE 90.1:7.4.4.3.1.4]
1004.5 Requirements for Compliance Path(s). Compliance shall be achieved by meeting the requirements of Section 1004.1, General; Section 1005.0, Mandatory Provisions; Section 1006.0, Prescriptive Path; and Section 1007.0, Submittals. Service water-heating systems and equipment shall comply with Section 1004.0, Section 1005.0, and Section 1007.0 of this code, and Section 7.8 of ASHRAE 90.1. [ASHRAE 90.1:7.2.1]

1004.6 Energy Cost Budget Method. Projects using the Energy Cost Budget Method in accordance with (Section 11 of ASHRAE 90.1) for demonstrating compliance with the standard shall also comply with Section 1006.0 of this code meet the requirements of Section 1005.0, Mandatory Provisions, in conjunction with Section 11 of ASHRAE 90.1, Energy Cost Budget Method. [ASHRAE 90.1:7.2.2]

1005.0 Mandatory Provisions.

1005.1 Load Calculations. Service water-heating system design loads for the purpose of sizing systems and equipment shall be determined in accordance with manufacturers’ published sizing guidelines or generally accepted engineering standards and handbooks acceptable to the adopting authority (e.g., ASHRAE Handbook – HVAC Applications). [ASHRAE 90.1:7.4.1]

1005.2 Equipment Efficiency. Water-heating equipment, hot-water supply boilers used solely for heating potable water, pool heaters, and hot-water storage tanks shall meet the criteria listed in Table 1005.2. Where multiple criteria are listed, all criteria shall be met. Omission of minimum performance requirements for certain classes of equipment does not preclude use of such equipment where appropriate. Equipment not listed in Table 1005.2 has no minimum performance requirements.

Exceptions: Water heaters and hot-water supply boilers having more than 140 gallons (530 L) of storage capacity are not required to meet the standby loss (SL) requirements of Table 1005.2 when all of the following criteria are met:
1. The tank surface is thermally insulated to R-12.5,
2. A standing pilot light is not installed, and
3. Gas- or oil-fired storage water heaters have a flue damper or fan-assisted combustion. [ASHRAE 90.1:7.4.2]

1005.5 Service Water-Heating System Controls.

1005.5.1 Storage Temperature Controls. Temperature controls shall be provided that allow for storage temperature adjustment from 120°F (49°C) or lower to a maximum temperature compatible with the intended use. Exception: When the manufacturers’ installation instructions specify a higher minimum thermostat setting to minimize condensation and resulting corrosion. [ASHRAE 90.1:7.4.4.1]

1005.6 Heat Traps. Vertical pipe risers serving storage water heaters and storage tanks not having integral heat traps and serving a nonrecirculating system shall have heat traps on both the inlet and outlet piping as close as practical to the storage tank. A heat trap is a means to counteract the natural convection of heated water in a vertical pipe run. The means shall be is either of the following:
1. A device specifically designed for the purpose or an arrangement of tubing that forms a loop of 360 degrees (6.28 rad), or
2. Piping that from the point of connection to the water heater (inlet or outlet) includes a length of piping directed downward before connection to the vertical piping of the supply water or hot-water distribution system, as applicable. [ASHRAE 90.1:7.4.6]

1006.0 Prescriptive Path.

1006.1 Space Heating and Service Water-Heating. The use of a gas-fired or oil-fired space-heating boiler system otherwise complying with Section 1004.0 to provide the total space heating and service water-heating for a building is allowed when one of the following conditions is met:
1. The single space-heating boiler, or the component of a modular or multiple boiler system that is heating the service water, has a standby loss in Btu/h (kW) not exceeding (13.3 x pmd + 400)/n, where (pmd) is the probable maximum demand in gallons per hour (gph) (L/h), determined in accordance with the procedures described in generally accepted engineering standards and handbooks, and (n) is the fraction of the year when the outdoor daily mean temperature is greater than 64.9°F (18.28ºC). The standby loss is to be determined for a test period of 24 hours duration while maintaining a boiler water temperature of at least 90°F (50°C) above ambient, with an ambient temperature between 60°F (16°C) and 90°F (32°C). For a boiler with a modulating burner, this test shall be conducted at the lowest input. (2) It is demonstrated to the satisfaction of the Authority Having Jurisdiction that the use of a single heat source will consume less energy than separate units.
2. The energy input of the combined boiler and water heater system is less than 150 000 Btu/h (44 kW). [ASHRAE 90.1:7.5.1]

1006.2 Service Water-Heating Equipment. Service water-heating equipment used to provide the additional function of space heating as part of a combination (integrated) system shall satisfy all stated requirements for the service water-heating equipment. [ASHRAE 90.1:7.5.2]
1006.3 Heat Recovery for Service Water-Heating.

1006.3.1 Condenser. Condenser heat recovery systems shall be installed for heating or preheating of service hot water provided all of the following are true:
(1) The facility operates 24 hours a day.
(2) The total installed heat-rejection capacity of the water-cooled systems exceeds 6,000,000 Btu/h (1,758 kW) of heat rejection.
(3) The design service water-heating load exceeds 1,000,000 Btu/h (293 kW).
ASHRAE 90.1:6.5.6.2.1

1006.3.2 Capacity. The required heat recovery system shall have the capacity to provide the smaller lesser of the following:
(1) Sixty percent of the peak heat rejection load at design conditions, or
(2) Preheat of the peak service hot water draw to 85°F (29°C).  [ASHRAE 90.1:6.5.6.2.2]

Exceptions:
(a) Facilities that employ condenser heat recovery for space heating with a heat recovery design exceeding 30 percent of the peak water-cooled condenser load at design conditions.
(b) Facilities that provide 60 percent of their service water-heating from on-site renewable energy, site-solar or site-recovered energy or from other sources.

<p>| TABLE 1005.2 PERFORMANCE REQUIREMENTS FOR WATER-HEATING EQUIPMENT-MINIMUM EFFICIENCY REQUIREMENTS [ASHRAE 90.1: TABLE 7.8] |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| <strong>EQUIPMENT TYPE</strong> | <strong>SIZE CATEGORY (INPUT)</strong> | <strong>SUBCATEGORY OR RATING CONDITION</strong> | <strong>PERFORMANCE REQUIRED</strong> | <strong>TEST PROCEDURE</strong> |
| <strong>Electric Table-Top Water Heaters</strong> | &lt;=12 kW | Resistance &lt;4000 (Btu/h)/gal &gt;20 gal and &lt;=120 gal | See footnote 7 | 10 CFR 430 Appendix E |
| | &lt;=12 kW | Resistance &lt;4000 (Btu/h)/gal &gt;20 gal and &lt;=55 gal | See footnote 7 | 10 CFR 430 Appendix E |
| | &gt;12 kW5 | Resistance =20 gal &lt;4000 (Btu/h)/gal | SL &lt;=0.3 + 27/Vm %/h | Section G.2 of ANSI Z21.10.3 10 CFR 431.106 |
| | &lt;=24 Amps and &lt;=250 Volts | Heat Pump | See footnote 7 | |
| <strong>Electric instantaneous water heaters</strong> | &lt;=12 kW | &gt;=4000 (Btu/h)/gal &lt;2 gal | See footnote 7 | 10 CFR 430 Appendix E |
| | &gt;12 kW and &lt;=58.6 kW3 | &gt;=4000 (Btu/h)/gal &lt;=2 gal &lt;=180°F | Very Small DP: UEF = 0.80 Low DP: UEF = 0.80 Medium DP: UEF = 0.80 High DP: UEF = 0.80 | 10 CFR 430 Appendix E |
| | &gt;58.6 kW3 | &gt;=4000 (Btu/h)/gal &lt;10 gal | No requirement | - |
| | | &gt;=4000 (Btu/h)/gal &gt;=10 gal | No requirement | - |</p>
<table>
<thead>
<tr>
<th>Gas storage water heaters</th>
<th>&lt;=75 000 Btu/h</th>
<th>&lt;=20 gal and &lt;=55 gal</th>
<th>See footnote 7</th>
<th>10 CFR 430 Appendix E</th>
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<tbody>
<tr>
<td>&lt;=75 000 Btu/h and &lt;=55 gal</td>
<td>&lt;=4000 (Btu/h)/gal</td>
<td>See footnote 7</td>
<td>10 CFR 430 Appendix E</td>
<td></td>
</tr>
<tr>
<td>&gt;75 000 Btu/h and &lt;=105 000 Btu/h</td>
<td>&gt;55 gal and &lt;=100 gal</td>
<td>80% Et (\frac{Q}{800 + 100V_V}) SL, Btu/h</td>
<td>Very Small DP: (\text{UEF} = 0.2674 - (0.0009 \times V_V))</td>
<td>10 CFR 430 Appendix E</td>
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<tr>
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<td>Low DP: (\text{UEF} = 0.5362 - (0.0012 \times V_V))</td>
<td>Sections G.1 and G.2 of ANSI Z21.10.3</td>
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<tr>
<td></td>
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<td>Medium DP: (\text{UEF} = 0.6002 - (0.0011 \times V_V))</td>
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<td>High DP: (\text{UEF} = 0.6597 - (0.0009 \times V_V))</td>
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<tr>
<td>&gt;105 000 Btu/h and &lt;=200 000 Btu/h</td>
<td>&gt;=4000 (Btu/h)/gal and &lt;2 gal</td>
<td>80% Et</td>
<td>See footnote 7</td>
<td>10 CFR 431.106</td>
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<tr>
<td>&gt;=200 000 Btu/h and &lt;=10 gal</td>
<td>&gt;=4000 (Btu/h)/gal and &lt;20 gal</td>
<td>See footnote 7</td>
<td>10 CFR 430 Appendix E</td>
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<tr>
<td>&gt;=200 000 Btu/h and &gt;=10 gal</td>
<td>&gt;=4000 (Btu/h)/gal and &gt;=10 gal</td>
<td>80% Et</td>
<td>10 CFR 431.106 Sections G.1 and G.2 of ANSI Z21.10.3</td>
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<tr>
<td>&lt;=105 000 Btu/h</td>
<td>&lt;=20 gal</td>
<td>&lt;=50 gal</td>
<td>See footnote 7</td>
<td>10 CFR 430 Appendix E</td>
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<tr>
<td>&gt;=105 000 Btu/h and &lt;=210 000 Btu/h</td>
<td>&gt;=4000 (Btu/h)/gal and &lt;=2 gal</td>
<td>80% Et (\frac{Q}{800 + 100V_V}) SL, Btu/h</td>
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<td>High DP: (\text{UEF} = 0.6740 - (0.0013 \times V_V))</td>
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<tr>
<td>&gt;140 000 Btu/h</td>
<td>&lt;=4000 (Btu/h)/gal</td>
<td>80% Et</td>
<td>10 CFR 431.106</td>
<td></td>
</tr>
<tr>
<td>&gt;=140 000 Btu/h and &lt;=210 000 Btu/h</td>
<td>&gt;=4000 (Btu/h)/gal and &lt;2 gal</td>
<td>See footnote 7</td>
<td>10 CFR 430 Appendix E as it appeared as of 1/1/2014</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>80% Et (\frac{Q}{800} - 0.0005 \times V_V)</td>
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</tr>
<tr>
<td></td>
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<td>EF &gt;= 0.59 - 0.0005 (\times V_V)</td>
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<tr>
<td>&gt;=210 000 Btu/h</td>
<td>&gt;=4000 (Btu/h)/gal and &lt;10 gal</td>
<td>80% Et</td>
<td>10 CFR 431.106 Sections G.1 and G.2 of ANSI Z21.10.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>78% Et (\frac{Q}{800 + 100V_V}) SL, Btu/h</td>
<td></td>
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</table>

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### Hot-water supply boilers, gas and oil

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Efficiency Requirements</th>
</tr>
</thead>
</table>
| >=300 000 Btu/h and <12 500 000 Btu/h             | >=4000 (Btu/h)/gal and <10 gal | 80% $E_F$

### Hot-water supply boilers, gas

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Efficiency Requirements</th>
</tr>
</thead>
</table>
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### Hot-water supply boilers, oil

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Efficiency Requirements</th>
</tr>
</thead>
</table>
| >=300 000 Btu/h and <12 500 000 Btu/h             | >=4000 (Btu/h)/gal and >=10 gal | 78% $E_F$

### Pool heaters, oil and gas

- **All**
- 50°F db 44.2°F wb outdoor air
- 80.0°F entering water
- 4.0 COP
- **See footnote 7**
- **ASHRAE-146**
- **10 CFR 430**
- **Appendix P**

### Heat pump pool heaters

- **All**
- 50°F db 44.2°F wb outdoor air
- 80.0°F entering water
- 4.0 COP
- **AHRI-1160**
- **10 CFR 430**
- **Appendix P**

### Unfired storage tanks

<table>
<thead>
<tr>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
</tr>
<tr>
<td>R-12.5</td>
</tr>
<tr>
<td>(none)</td>
</tr>
</tbody>
</table>

For SI units: 1 gallon = 3.785 L, 1000 British thermal units per hour = 0.293 kW, °C = (°F-32)/1.8

**Notes:**

1. Thermal efficiency ($E_F$) is a minimum requirement, while standby loss (SL) is a maximum requirement Btu/h based on a 70°F temperature difference between stored water and ambient requirements. In the SL equation, $V$ is the rated volume in gallons (gal) (L) and $Q$ is the nameplate input rate in Btu/h (kW). $V_m$ is the measured volume in the tank in gallons (gal) (L). Standby loss for electric water heaters is in terms of %/h and denoted by the term "SL." Standby loss for gas and oil water heaters is in terms of Btu/h (kW) and denoted by the term "SL." Draw pattern (DP) refers to the water draw profile in the Uniform Energy Factor (UEF) test. UEF and Energy Factor (EF) are minimum requirements. In the UEF standard equations, $V_r$ refers to the rated volume in gallons (gal) (L).

2. ASHRAE 90.1 Section 12 contains a complete specification, including the year version, of the referenced test procedure.


4. **Electric** instantaneous water heaters with input rates below 200 000 Btu/h (58.6 kW) must capacities greater than 40 000 Btu/h (12 kW) and less than or equal to 200 000 Btu/h (58.6 kW) shall comply with these the requirements for 200 000 Btu/h (58.6 kW) if the water heater meets one of the following conditions:
   - Has a storage volume greater than 2 gallons (7.6 L),
   - Is designed to heat water to temperatures of greater than 180°F (82°C), or
   - Higher Uses three-phase power.

5. **Gas** storage water heaters with input rates less than 40 046 Btu/h (12 kW) and greater than 75 000 Btu/h (22 kW) and less than or equal to 105 000 Btu/h (31 kW) shall comply with these the requirements for greater than 105 000 Btu/h (31 kW) if the water heater meets one of the following conditions:
   - Has a storage volume greater than 120 gallons (454 L),
   - Is designed to heat water to temperatures of greater than 180°F (82°C), or
   - Higher Uses three-phase power.

6. **Oil** storage water heaters with input capacities greater than 105 000 Btu/h (31 kW) and less than or equal to 140 000 Btu/h (41 kW) must comply with the requirements for greater than 140 000 Btu/h (41 kW) if the water heater meets one of the following conditions:
   - Has a storage volume greater than 120 gallons (454 L),
   - Is designed to heat water to temperatures of greater than 180°F (82°C), or
   - Uses three-phase power.

7. Refer to Section 7.5.3 of ASHRAE 90.1 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.

8. In the U.S., the efficiency requirements for water heaters or gas pool heaters in this category or subcategory are specified as consumer products by the U.S. Department of Energy (USDOE) as defined. Those requirements and applicable test procedures are found in the Code of Federal Regulations 10 CFR Part 430. **Informative Note:** See ASHRAE 90.1 Informative Appendix F for the U.S. Department of Energy efficiency requirements applicable to these water heaters and pool heaters.
TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFR 40, 430, Subpart B 10 CFR 430</td>
<td>Energy Conservation Program for Consumer Products Test Procedures</td>
<td>Table 1005.2</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

**Note:** 10 CFR 430, 10 CFR 431.106, and ASHRAE 90.1 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**SUBSTANTIATION:**
The above section is being revised to correlate with ASHRAE 90.1-2019 (latest version) in accordance with Section 16.0 of the IAPMO Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard (Extract Guidelines).

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**
There is concern with Section 418.2 and Section 418.4 as the language should reference pools, spas and hot tubs rather than only pools. The ASHRAE definition for “pool” is required to elucidate the applicability of provisions within these sections.

Additionally, there are portions of Table 1005.2 which are being stricken but should remain as they offer needed clarity.

The Technical Committee acknowledges that ASHRAE may also have additional revisions currently being published, requests technical reasonings for the submitted extract updates, and recommends that these concerns be addressed via public comment.

**TOTAL ELIGIBLE TO VOTE:** 30

**VOTING RESULTS:** AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments

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**PUBLIC COMMENT 1**

**Code Year:** 2023 WEStand  **Section #:** 418.2, 418.4, Chapter 10, Table 1201.1  **Item #:** 073

**SUBMITTER:** Emily Toto  ASHRAE  **Item #:** 073

**RECOMMENDATION:** Accept as Modified

Request to **replace** the code change proposal by this public comment.

**418.0 Swimming Pools, Spas, and Hot Tubs.**

**418.2 On and Off Switch.** Pool, spa, and hot tub heaters shall be equipped with a readily accessible on and off switch to allow shutting off the heater without adjusting the thermostat setting. Pool heaters fired by natural gas shall not have continuously burning pilot lights. {ASHRAE 90.1:7.4.5.1}
1004.2 New Buildings. Service water-heating systems and equipment shall comply with the requirements of this section as described in Section 1004.5. [ASHRAE 90.1:7.1.1.1-7.1.1.2]

1004.3 Additions to Existing Buildings. Service water-heating systems and equipment shall comply with the requirements of this section Section 1004.5.

Exception: When the service water-heating to an addition is provided by existing service water-heating systems and equipment, such systems and equipment shall not be required to comply with this standard. However, any new systems or equipment installed must comply with specific requirements applicable to those systems and equipment. [ASHRAE 90.1:7.1.1.3]

1004.4 Alterations to Existing Buildings Service Water-Heating Systems and Equipment. Building service water-heating equipment installed as a direct replacement for existing building service water-heating equipment shall comply with the requirements of Section 1004.0 applicable to the equipment being replaced. New and replacement piping shall comply with Section 4095.31005.0.

Exception: Compliance shall not be required where there is insufficient space or access to meet these requirements. [ASHRAE 90.1:7.1.1.1-7.1.1.4]

1004.5 Requirements for Compliance Path(s). Compliance shall be achieved by meeting the requirements of Section 1004.1. General; Section 1005.0. Mandatory Provisions; Section 1006.0. Prescriptive Path; and Section 1007.0. Submittals. Service water-heating systems and equipment shall comply with Section 1004.0, Section 1005.0, Section 1006.0, Section 1007.0 of this code, and Section 7.8 of ASHRAE 90.1. [ASHRAE 90.1:7.2.1]

1004.6 Energy Cost Budget Method. Projects using the Energy Cost Budget Method (Section 11 of ASHRAE 90.1) for demonstrating compliance with the standard shall meet the requirements of Section 1005.0, Mandatory Provisions, in conjunction with Section 11 of ASHRAE 90.1; Energy Cost Budget Method. [ASHRAE 90.1:7.2.2]

1005.0 Mandatory Provisions.

1005.1 Load Calculations. Service water-heating system design loads for the purpose of sizing systems and equipment shall be determined in accordance with manufacturers’ published sizing guidelines or generally accepted engineering standards and handbooks acceptable to the adopting authority (e.g., ASHRAE Handbook – HVAC Applications). [ASHRAE 90.1:7.4.1]

1005.2 Equipment Efficiency. Water-heating equipment, hot-water supply boilers used solely for heating potable water, pool heaters, and hot-water storage tanks shall meet the criteria listed in Table 1005.2. Where multiple criteria are listed, all criteria shall be met. Omission of minimum performance requirements for certain classes of equipment does not preclude use of such equipment where appropriate. Equipment not listed in Table 1005.2 has no minimum performance requirements.

Exceptions: Water heaters and hot-water supply boilers having more than 140 gallons (530 L) of storage capacity are not required to meet the standby loss (SL) requirements of Table 1005.2 when all of the following criteria are met:

(1) The tank surface is thermally insulated to R-12.5.
(2) A standing pilot light is not installed.
(3) Gas- or oil-fired storage water heaters have a flue damper or fan-assisted combustion. [ASHRAE 90.1:7.4.2]

1005.5 Service Water-Heating System Controls. Temperature controls shall comply with Section 1005.5.1 and Section 1005.5.2.

1005.5.1 Storage Temperature Controls. Temperature controls shall be provided that allow for storage temperature adjustment from 120°F (49°C) or lower to a maximum temperature compatible with the intended use.

Exception: When the manufacturers’ installation instructions specify a higher minimum thermostat setting to minimize condensation and resulting corrosion. [ASHRAE 90.1:7.4.4.1]
1005.6 Heat Traps. Vertical pipe risers serving storage water heaters and storage tanks not having integral heat traps and serving a nonrecirculating system shall have heat traps on both the inlet and outlet piping as close as practical to the storage tank. A heat trap is a means to counteract the natural convection of heated water in a vertical pipe run. The means shall be either of the following:

1. A device specifically designed for the purpose or an arrangement of tubing that forms a loop of 360 degrees (6.28 rad), or
2. Piping that from the point of connection to the water heater (inlet or outlet) includes a length of piping directed downward before connection to the vertical piping of the supply water or hot-water distribution system, as applicable. [ASHRAE 90.1:7.4.6]

1006.0 Prescriptive Path.
1006.1 Space Heating and Service Water-Heating. The use of a gas-fired or oil-fired space-heating boiler system otherwise complying with Section 1004.0 to provide the total space heating and service water-heating for a building is allowed when one of the following conditions is met:

1. The single space-heating boiler, or the component of a modular or multiple boiler system that is heating the service water, has a standby loss in Btu/h (kW) not exceeding \((13.3 \times \text{pmd} + 400)/n\), where \((\text{pmd})\) is the probable maximum demand in gallons per hour \((\text{gph})\) \((L/h)\), determined in accordance with the procedures described in generally accepted engineering standards and handbooks, and \((n)\) is the fraction of the year when the outdoor daily mean temperature is greater than 64.9°F \((18.28ºC)\). The standby loss shall be determined for a test period of 24 hours duration while maintaining a boiler water temperature of at least 90°F \((50ºC)\) above ambient, with an ambient temperature between 60°F \((16ºC)\) and 90°F \((32ºC)\). For a boiler with a modulating burner, this test shall be conducted at the lowest input.
2. It is demonstrated to the satisfaction of the Authority Having Jurisdiction that the use of a single heat source will consume less energy than separate units.
3. The energy input of the combined boiler and water heater system is less than 150 000 Btu/h (44 kW). [ASHRAE 90.1:7.5.1]

1006.2 Service Water-Heating Equipment. Service water-heating equipment used to provide the additional function of space heating as part of a combination (integrated) system shall satisfy all stated requirements for the service water-heating equipment. [ASHRAE 90.1:7.5.2]

1006.3 Heat Recovery for Service Water-Heating. Heat recovery systems shall comply with Section 1006.3.1 and Section 1006.3.2.

1006.3.1 Condenser. Condenser heat recovery systems shall be installed for heating or preheating of service hot water provided all of the following are true:

1. The facility operates 24 hours a day.
2. The total installed heat-rejection capacity of the water-cooled systems exceeds 6 000 000 Btu/h (1758 kW) of heat rejection.
3. The design service water-heating load exceeds 1 000 000 Btu/h (293 kW). [ASHRAE 90.1:6.5.6.2.1]

1006.3.2 Capacity. The required heat recovery system shall have the capacity to provide the smaller lesser of the following:

1. Sixty percent of the peak heat rejection load at design conditions, or
2. Preheat of the peak service hot water draw to 85°F \((29ºC)\). [ASHRAE 90.1:6.5.6.2.2]

Exceptions:
(a) Facilities that employ condenser heat recovery for space heating with a heat recovery design exceeding 30 percent of the peak water-cooled load at design conditions.
(b) Facilities that provide 60 percent of their service water-heating from on-site renewable energy, site-solar or site-recovered energy or from other sources. [ASHRAE 90.1:6.5.6.2.2]

| TABLE 1005.2 |
| PERFORMANCE REQUIREMENTS FOR WATER-HEATING EQUIPMENT -MINIMUM EFFICIENCY REQUIREMENTS |
| [ASHRAE 90.1: TABLE 7-87.4-1] |

<table>
<thead>
<tr>
<th>EQUIPMENT TYPE</th>
<th>SIZE CATEGORY (INPUT)</th>
<th>SUBCATEGORY OR RATING CONDITION</th>
<th>PERFORMANCE REQUIRED1</th>
<th>TEST PROCEDURE2,3</th>
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<tbody>
<tr>
<td>Electric Table-Top Water Heaters &lt;=12 kW</td>
<td>Resistance &lt;4000 (Btu/h)/gal and &lt;=120 gal &gt;=20 gal</td>
<td>See footnote 7</td>
<td>10 CFR 430 Appendix E</td>
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<td>Electric storage water heaters &lt;=12 kW5</td>
<td>Resistance &lt;4000 (Btu/h)/gal and &lt;=55 gal &gt;=20 gal</td>
<td>See footnote 7</td>
<td>10 CFR 430 Appendix E</td>
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NOTE: Footnotes not provided.
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<th>Power Range</th>
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<th>Efficiency Equation</th>
<th>Remarks</th>
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<td>&gt;12 kW (^5)</td>
<td>Electric instantaneous water heaters</td>
<td>&gt;180°F</td>
<td>80% Et (Q/800 + 100vV)SL, Btu/h</td>
<td>See footnote 7</td>
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<td>&lt;4000 (Btu/h)/gal</td>
<td>Resistance &gt;=20 gal</td>
<td>SL &lt;= 0.3 + 27/V,m %/h</td>
<td>Section G.2 of ANSI Z21.10.3</td>
<td>10 CFR 430 Appendix E</td>
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<td>&gt;55 gal and &lt;=120 gal</td>
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<td>&lt;=58.6 kW (^3)</td>
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<td>&lt;=120 gal</td>
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</tbody>
</table>
Medium DP:
\[ UEF = 0.6194 - (0.0016 \times V_r) \]

High DP:
\[ UEF = 0.6740 - (0.0013 \times V_r) \]

Oil instantaneous water heaters

<table>
<thead>
<tr>
<th>Volume Range</th>
<th>Energy Efficiency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;140,000 Btu/h</td>
<td>80% ( E_t )</td>
<td>See footnote 7, ( 80% E_t ), ( EF &gt;= 0.59-0.0005 \times V ).</td>
</tr>
<tr>
<td>&lt;=210,000 Btu/h</td>
<td>80% ( E_t )</td>
<td></td>
</tr>
<tr>
<td>&gt;210,000 Btu/h</td>
<td>78% ( E_t )</td>
<td></td>
</tr>
</tbody>
</table>

Hot-water supply boilers, gas and oil

<table>
<thead>
<tr>
<th>Volume Range</th>
<th>Energy Efficiency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;=300,000 Btu/h and &lt;12,500,000 Btu/h</td>
<td>80% ( E_t )</td>
<td></td>
</tr>
<tr>
<td>&gt;=200,000 Btu/h and &lt;2 gal</td>
<td>80% ( E_t )</td>
<td></td>
</tr>
<tr>
<td>&gt;=200,000 Btu/h and &lt;10 gal</td>
<td>80% ( E_t )</td>
<td></td>
</tr>
</tbody>
</table>

Hot-water supply boilers, gas

<table>
<thead>
<tr>
<th>Volume Range</th>
<th>Energy Efficiency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;=300,000 Btu/h and &lt;12,500,000 Btu/h</td>
<td>80% ( E_t )</td>
<td></td>
</tr>
<tr>
<td>&gt;=200,000 Btu/h and &lt;2 gal</td>
<td>80% ( E_t )</td>
<td></td>
</tr>
<tr>
<td>&gt;=200,000 Btu/h and &lt;10 gal</td>
<td>80% ( E_t )</td>
<td></td>
</tr>
</tbody>
</table>

Pool heaters, oil and gas

<table>
<thead>
<tr>
<th>Volume Range</th>
<th>Energy Efficiency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>82% ( E_t ) for commercial pool heaters</td>
<td>See footnote 7</td>
</tr>
</tbody>
</table>

Heat pump pool heaters

<table>
<thead>
<tr>
<th>Volume Range</th>
<th>Energy Efficiency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>4.0 COP</td>
<td>AHRI 1169</td>
</tr>
</tbody>
</table>

Unfired storage tanks

<table>
<thead>
<tr>
<th>Volume Range</th>
<th>Energy Efficiency</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>R-12.5</td>
<td>(none)</td>
</tr>
</tbody>
</table>

For SI units: 1 gallon = 3.785 L, 1000 British thermal units per hour = 0.293 kW, \( ^\circ C = (^\circ F - 32)/1.8 \)

Notes:

1. Thermal efficiency \( (E_t) \) is a minimum requirement, while standby loss \( (SL) \) is a maximum requirement \( \text{Btu/h} \) based on a 70\(^\circ\)F temperature difference between stored water and ambient requirements. In the \( SL \) equation, \( V \) is the rated volume in gallons (gal) (L) and \( Q \) is the nameplate input rate in Btu/h (kW). \( V_m \) is the measured volume in the tank in gallons (gal) (L). Standby loss for electric water heaters is in terms of %/h and denoted by the term "S," and standby loss for gas and oil water heaters is in terms of Btu/h (kW) and denoted by the term "SL." Draw pattern \( (DP) \) refers to the water draw profile in the Uniform Energy Factor \( (UEF) \) test. \( UEF \) and Energy Factor \( (EF) \) are minimum requirements. In the \( UEF \) standard equations, \( V \) refers to the rated volume in gallons (gal) (L).

2. ASHRAE 90.1 Section 12 contains a complete specification, including the year version, of the referenced test procedure.


4. Electric instantaneous water heaters with input rates below 200,000 Btu/h (58.6 kW) must capacities greater than 12,500,000 Btu/h (11.7 kW) and less than or equal to 200,000 Btu/h (58.6 kW) shall comply with these the requirements for 200,000 Btu/h (58.6 kW) if the water heater meets one of the following conditions:
   a. Has a storage volume greater than 2 gallons (7.6 L).
   b. Is designed to heat provide outlet hot water temperatures of greater than 180°F (82°C), or
   c. higher Uses three-phase power.
Electric storage water heaters with input rates less than 40,946 Btu/h (12 kW) shall be in accordance with the requirements where greater than 75,000 Btu/h (22 kW) and less than or equal to 105,000 Btu/h (30.8 kW) shall comply with the following conditions:

a. Has a storage volume greater than 120 gallons (454 L);
b. Is designed to heat water to temperatures greater than 180°F (82°C), or

c. Uses three-phase power.

Oil storage water heaters with input capacities greater than 105,000 Btu/h (30.8 kW) and less than or equal to 140,000 Btu/h (41 kW) must comply with the requirements for greater than 140,000 Btu/h (41 kW) if the water heater meets one of the following conditions:

a. Has a storage volume greater than 120 gallons (454 L);
b. Is designed to provide outlet hot water at temperatures greater than 180°F (82°C); or

c. Uses three-phase power.

Refer to Section 7.5.3 of ASHRAE 90.1 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.

In the U.S., the efficiency requirements for water heaters or gas pool heaters in this category or subcategory are specified in Section 7.5.3 of ASHRAE 90.1 as defined by the U.S. Department of Energy (USDOE) as defined in the Code of Federal Regulations 10 CFR Part 430. See ASHRAE 90.1 Informative Appendix F for the U.S. Department of Energy efficiency requirements applicable to these water heaters and pool heaters.

### TABLE 1201.1

**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFR 10.430, Subpart B 10 CFR 430</td>
<td>Energy Conservation Program for Consumer Products—Test Procedures</td>
<td>Table 1005.2</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

**Note:** 10 CFR 430, 10 CFR 431.106, and ASHRAE 90.1 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**SUBSTANTIATION:**
The above section is being revised to correlate with ASHRAE 90.1-2019 (latest version) in accordance with Section 16.0 of the IAPMO Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard (Extract Guidelines).

In response the Technical Committee's reasoning for rejection:
The phrase "pool, spa, and hot tub heaters" is being kept in both Section 418.2 (On and Off Switch) and Section 418.4 (Time Switches) as requested.

The changes in the ASHRAE Table 7.4-1 are for alignment with the federal regulations. This table is ASHRAE 90.1’s way of organizing the requirements that have already been established by the DOE, so we are reporting their categories from 10 CFR 430. Therefore, it's not appropriate to alter the markup apart from what is needed to create alignment between ASHRAE 90.1 and 10 CFR 430, and that is what was done in the proposal for Item #073.

If the Technical Committee does not wish to update Table 1005.2 as proposed, the extract number would need to be revised to reflect the publication year [ASHRAE 90.1-2016: Table 7.8]. However, this would also mean the numbering updates in the document would not apply.
CHAPRER 5
PEAK WATER DEMAND CALCULATOR

C-101.0 General.
C-101.1 Applicability. This appendix provides the method for estimating the supply demand load for the building water supply and principal branches and risers for new construction of single- and multi-family dwellings with water-conserving plumbing fixtures, fixture fittings, and appliances. The plumbing code shall be used for all other occupancies.
Note: The requirements listed in this chapter are based on the technical paper entitled “Peak Water Demand Study.” Both the Water Demand Calculator and a copy of this technical paper are available for download at: https://www.iapmo.org/water-demand-calculator/.

C-102.0 Demand Load.
C-102.1 Water Demand Calculator. The estimated supply demand design flow rate for the building supply and principal branches and risers shall be determined by the IAPMO Water Demand Calculator, available for download at www.iapmo.org/Water-Demand-Calculator/.
C-102.1.1 Water-Conserving Fixtures. The flow rates for plumbing fixtures, fixture fittings, and appliances shall not exceed the design flow rates in Table C-102.1.
C-102.1.2 Other Fixtures. Indoor fixtures, fixture fittings, and appliances not included in Table C-102.1 shall be added in Rows 12 through 14 in the Water Demand Calculator as Other Fixtures. The probability of use and flow rate for Other Fixtures shall be added by selecting a comparable probability of use and design flow rate from Columns [C] and [E] the Water Demand Calculator.
C-102.2 Supply Demand. The supply demand flow rate shall be determined in accordance with Section 502.2.1 and Section 502.2.2.
C-102.2.1 Meter and Building Supply. To determine the design supply demand flow rate for the water meter and building supply, enter the total number of each indoor plumbing fixtures and appliances for the building into Column [B] of the Water Demand Calculator and run the Calculator. (See Table C-102.3 for an example Figure 502.2.1.)
### TABLE C 102.1

**MAXIMUM DESIGN FLOW RATE FOR WATER-CONSERVING PLUMBING FIXTURES, FIXTURE FITTINGS, AND APPLIANCES IN RESIDENTIAL OCCUPANCIES**

<table>
<thead>
<tr>
<th>FIXTURE AND APPLIANCE</th>
<th>MAXIMUM DESIGN FLOW RATE (gallons per minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar Sink</td>
<td>1.5</td>
</tr>
<tr>
<td>Bathtubs&lt;sup&gt;2&lt;/sup&gt;</td>
<td>5.5</td>
</tr>
<tr>
<td>Bidet</td>
<td>2.0</td>
</tr>
<tr>
<td>Clothes Washer&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3.5</td>
</tr>
<tr>
<td>Combination Bath/Shower</td>
<td>5.5</td>
</tr>
<tr>
<td>Dishwasher&lt;sup&gt;1&lt;/sup&gt;</td>
<td>1.3</td>
</tr>
<tr>
<td>Kitchen Faucet</td>
<td>2.2</td>
</tr>
<tr>
<td>Laundry Faucet (with aerator)</td>
<td>2.0</td>
</tr>
<tr>
<td>Lavatory Faucet</td>
<td>1.5</td>
</tr>
<tr>
<td>Shower, per head</td>
<td>2.0</td>
</tr>
<tr>
<td>Water Closet, 1.28 GPF Gravity Tank</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Other fixtures</strong></td>
<td><strong>6.0</strong></td>
</tr>
</tbody>
</table>

For SI units: 1 gallon per minute = 0.06 L/s

<sup>1</sup> Clothes washers and dishwashers shall have an Energy Star label.

<sup>2</sup> Including whirlpools and similar fixtures.

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**FIGURE 502.2.1**

**WATER DEMAND CALCULATOR**

**TABLE C 102.3**

**WATER DEMAND CALCULATOR EXAMPLE**

(remove table in its entirety)
C-102.4502.2.2 **Fixture Branches and Fixture Supplies-Risers.** To determine the design supply demand flow rate for fixture branches and risers, enter the total number of each plumbing fixtures and appliances for the fixture on each branch or riser into Column [B] of the Water Demand Calculator and run the Calculator. The flow rate for one fixture branch and one fixture supply shall be the design flow rate of the fixture according to Table C-102.4502.1.1.

C-102.6502.3 **Continuous Supply Demand.** The continuous supply demands in gallons per minute (gpm) for lawn sprinklers, air conditioners, hose bibbs, etc., shall be added to the total estimated demand for the building supply as determined by Section C-102.3. Where there is more than one hose bibb installed on the plumbing system, the demand for only one hose bibb shall be added to the total estimated demand for the building supply. Where a hose bibb is installed on a fixture branch, the demand of the hose bibb shall be added to the design flow rate for the fixture branch as determined by Section C-102.4 determined for the building supply, branches, and risers in accordance with the plumbing code.

**Exceptions:**
1. Where there is more than one hose bibb installed on the plumbing system, the demand for only one hose bibb shall be added to the total estimated demand for the building supply.
2. Where a hose bibb is installed on a principal branch, riser or fixture branch, the demand of the hose bibb shall be added to the design flow rate for the principal branch, riser, or fixture branch as applicable.

C-102.7503.0 **Size of Water Piping per Appendix A.**

503.1 **General.** Except as provided in Section C-102.0 for estimating the demand load for single- and multi-family dwellings, the size of each water piping system shall be determined in accordance with the procedure set forth in Appendix A of the 2021 UPC Section 503.2 and Section 503.3, the procedure for sizing the water supply system shall be determined in accordance with the plumbing code.

503.2 **Total Demand Load.** The total demand load shall be the sum of the supply demand load calculated in accordance with Section 502.2 and the continuous demand load calculated in accordance with Section 502.3 for the building supply, branches, risers and fixture branches as applicable.

503.3 **Determining Pipe Diameters.** After determining the permissible friction loss per 100 feet (30 480 mm) of pipe and the total demand loads in accordance with Section A 104.0503.2, and the demand flow in accordance with the Water Demand Calculator, the diameter of the building supply pipe, branches and risers shall be obtained from Chart A 105.1(1), Chart A 105.1(2), Chart A 105.1(3), Chart A 105.1(4), Chart A 105.1(5), Chart A 105.1(6), or Chart A 105.1(7) whichever is applicable, in accordance with Section A 105.0 and Section A 106.0. Velocities shall be in accordance with Section A 107.1. Appendix I Installation Standard 31-2014 of the 2021 UPC, Figure 3 and Figure 4 shall be permitted when sizing PEX systems the sizing charts in Appendix C.

(renumbering remaining chapters)

**SUBSTANTIATION:**

This proposal is to move the use of the Water Demand Calculator (WDC), currently in the informative Appendix C of WE•Stand and moving the use of the WDC into the normative section of WE•Stand as Chapter 5. As noted in the proposal, the new mandated requirements are to use the WDC for estimating the demand load for the building water supply and principal branches for single- and multi-family dwellings.

The development of the WDC is documented in the study, Peak Water Demand Study (Buchberger, et.al. 2017. https://www.iapmo.org/water-demand-calculator/). The Study concluded, "The computational methods for estimating water supply demand for single and multi-family dwellings identified in this report and coded into the Water Demand Calculator are offered as an improved method to avoid over-design resulting from Hunter's Curve as the current method used in the U.S. plumbing codes." The study also concludes that "A key advantage of the Wistort approach is that it does not rely on mysterious fixture units and it is not calibrated to any particular fixture type. Hence, the dimensionless formulation will remain valid even as water use habits change and fixture types evolve in the future."

Since the publication of the Study and the inclusion of the WDC in an informative Appendix of WE•Stand, a number of states and local jurisdictions have taken the lead in adopting the use of the Water Demand Calculator including: Nevada (2018), North Dakota (2020), Oregon (2021), and the city of Seattle along with King County in Washington (2021).

In November 2021 Gary Klein and Associates, Inc., on behalf of 20 organizations, submitted a Petition to the California Building Standards Commission to adopt the use of the Water Demand Calculator (Petition) in determining the estimated design flow rate.
The following benefits were cited in the Petition:
• Construction cost savings due to:
  – Smaller diameter pipes and fittings, valves, pumps, and other equipment,
  – Smaller inside diameter pipe insulation, and
  – Smaller water service entrance size, resulting in smaller water meter size with lower connection fees.
• Ongoing cost savings due to:
  – Water savings from faster hot water delivery times, resulting in smaller monthly water service charges and lower associated volumetric sewer charges,
  – Energy savings due to decreased heat loss in hot water distribution system, particularly in multifamily buildings with a recirculation system, and
  – Embedded energy savings for the water and wastewater utilities due to customer indoor water savings.
• Reduced public health and safety risks and improved water quality due to shorter water dwell times within plumbing systems. Each floor plan determines the distance between the mechanical room and the fixtures. UPC Appendix M does not change the length of the pipe, only the diameter. With the pipe diameter on each segment reduced, the pipe volume will be reduced.
• Reduced carbon emissions due to material savings and energy reductions.

Figure 1 from the Petition provides a comparison of Actual Peak Flow Rates to calculated rates using the Hunter’s Curve. The figure underscores that the standard practice – based on the Hunter’s curve – overestimates the peak flow rates when compared to use with plumbing fixtures and appliances that have been in buildings since the Energy Policy Act of 1992 went into effect the mid-1990s.

Figure 1: Comparing UPC Appendix A (Hunter’s Curve) to Actual Peak Flow Rates (99th Percentile of non-zero flows for all sampling intervals over the entire monitoring period) in Multifamily Buildings (ranging in size from 8 to 384 apartments). The top graph in Figure 1 shows data for all buildings analyzed to date. The bottom graph in Figure 1 zooms in on the cluster of buildings with fewer than 300 Water Supply Fixture Units (WSFU).

Figure 2 from the Petition compares the monitored data from the 16 multifamily buildings to the peak water demand estimates based on UPC Appendix M. The comparison shows that Water Demand Calculator provides a conservative approach to estimate peak water flow rates, providing a margin of safety at least 1.8 times the measured data in multifamily buildings.
The WE•Stand Premise Water System Design Task Group fully endorses this proposal based on the significant theoretical work conducted in the development of the Water Demand Calculator followed by the validation of the theory through the comparison of the Water Demand Calculator to actual field peak flow rates.

Additional information on the Water Demand Calculator may be found via the following link: https://www.iapmo.org/water-demand-calculator/

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as there is concern with referencing the sizing charts located in Appendix C, as shown in Item #123. Where jurisdictions do not adopt Appendix C, no guidance will be provided for determining pipe diameters of the building supply, branches, and risers when implementing the Water Demand Calculator (WDC).

Incorporating Chart C101.1(1) through Chart C101.1(9) from Item #123 into this proposal would prevent this conflict and ensure applicable tools are provided for utilizing the WDC. The Technical Committee has identified this as the only reason for rejection and requests this change be made via public comment.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 25 NEGATIVE: 3 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:

KENDZEL: As the Chair of the Premise Water Supply System Design Task Group and proponent of the proposal, I support the Committee’s suggestions and will bring them to the Task Group for consideration during the public comment period.
EXPLANATION OF NEGATIVE:

KOELLER: As noted on the committee statement, "has identified this as the only reason for rejection" and that reason can be remedied. Therefore, I don't believe this very comprehensive proposal should be rejected due only to a few charts.

LENGER: Although some minor corrections are needed the merit of this proposal is sound and needed.

THOMPSON: Addition of this text to include the Water Demand Calculator is beneficial to users of the code. It should be accepted and brought back during the public comment period with the additional improvements indicated in the committee statement.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand Section #: Chapter 5, Appendix C Item #: 074
SUBMITTER: Jim Kendzel Chair, WE-Stand Premise Water Supply System Design Task Group
Comment #: 1

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

CHAPTER 5
PEAK WATER DEMAND CALCULATOR

C-101.0501.0 General.
C-101.1501.1 Applicability. This appendix provides a method for estimating the supply demand load for the building water supply and principal branches and risers for new construction of single- and multi-family dwellings with water-conserving plumbing fixtures, fixture fittings, and appliances. The plumbing code shall be used for all other occupancies. Note: The requirements listed in this chapter are based on the technical paper entitled “Peak Water Demand Study.” Both the Water Demand Calculator and a copy of this technical paper are available for download at: https://www.iapmo.org/Water-Demand-Calculator/.

C-102.0502.0 Demand Load.
C-102.2502.1 Water Demand Calculator. The estimated supply design flow rate for the building supply and principal branches and risers shall be determined by the IAPMO Water Demand Calculator, available for download at: www.iapmo.org/Water-Demand-Calculator/.

C-102.4502.1 Water-Conserving Fixtures. The flow rates for plumbing fixtures, fixture fittings, and appliances shall not exceed the design flow rates in Table C-102.4502.1.1.
C-102.6502.1.2 Other Fixtures. Indoor fixtures not included-specified in Table C-102.4502.1.1 shall be added in Rows 12 through 14 in the Water Demand Calculator as Other Fixtures. The probability of use and flow rate for Other Fixtures shall be added by selecting a comparable probability of use and design flow rate from Columns [C] and [E] the Water Demand Calculator.

502.2 Supply Demand. The supply demand flow rate shall be determined in accordance with Section 502.2.1 and Section 502.2.2.
C-102.3502.2.1 Meter and Building Supply. To determine the design-supply demand flow rate for the water meter and building supply, enter the total number of each indoor plumbing fixtures and appliances for the building into Column [B] of the Water Demand Calculator and run the Calculator. (See Figure 502.2.1 Table C-102.3 for an example.)
### TABLE C-102.4502.1.1
MAXIMUM DESIGN FLOW RATE FOR WATER-CONSERVING PLUMBING FIXTURES, FIXTURE FITTINGS, AND APPLIANCES IN RESIDENTIAL OCCUPANCIES

<table>
<thead>
<tr>
<th>FIXTURE AND APPLIANCE</th>
<th>MAXIMUM DESIGN FLOW RATE (gallons per minute)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1.5</td>
</tr>
<tr>
<td>Bathtub</td>
<td>5.5</td>
</tr>
<tr>
<td>Bidet</td>
<td>2.0</td>
</tr>
<tr>
<td>Clothes Washer</td>
<td>3.5</td>
</tr>
<tr>
<td>Combination Bath/Shower</td>
<td>5.5</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>1.3</td>
</tr>
<tr>
<td>Kitchen Faucet</td>
<td>2.2</td>
</tr>
<tr>
<td>Laundry Faucet (with aerator)</td>
<td>2.0</td>
</tr>
<tr>
<td>Lavatory Faucet</td>
<td>1.5</td>
</tr>
<tr>
<td>Shower, per head</td>
<td>2.0</td>
</tr>
<tr>
<td>Water Closet, 1.28 GPF Gravity Tank</td>
<td>3.0</td>
</tr>
<tr>
<td>Other fixtures</td>
<td>6.0</td>
</tr>
</tbody>
</table>

For SI units: 1 gallon per minute = 0.06 L/s

1 Clothes washers and dishwashers shall have an Energy Star label.
2 Including whirlpools and similar fixtures.

---

**C-102.4502.2 Fixture Branches and Fixture Supplies Risers.** To determine the design supply demand flow rate for fixture branches and risers, enter the total number of each plumbing fixtures and appliances for the fixture on each branch or riser into Column [B] of the Water Demand Calculator and run the Calculator. The flow rate for one fixture branch and one fixture supply shall be the design flow rate of the fixture according to Table C-102.4502.1.1.

**C-102.502.3 Continuous Supply Demand.** The continuous supply demands in gallons per minute (gpm) for lawn sprinklers, air conditioners, hose bibbs, etc., shall be added to the total estimated demand for the building supply as determined by Section C-102.3. Where there is more than one hose bibb installed on the plumbing system, the demand for only one hose bibb shall be added to the total estimated demand for the building supply. Where a hose bibb is installed on a fixture branch, the demand of the hose bibb shall be added to the design flow rate for the fixture branch as determined by Section C-102.4 determined for the building supply, branches, and risers in accordance with the plumbing code.

**Exceptions:**

1. Where there is more than one hose bibb installed on the plumbing system, the demand for only one hose bibb shall be added to the total estimated demand for the building supply.
2. Where a hose bibb is installed on a principal branch, riser or fixture branch, the demand of the hose bibb shall be added to the design flow rate for the principal branch, riser, or fixture branch as applicable.
C 102.7 503.0 Size of Water Piping per Appendix A.

503.1 General. Except as provided in Section C 102.0 for estimating the demand load for single- and multi-family dwellings, the size of each water piping system shall be determined in accordance with the procedure set forth in Appendix A of the 2021 UPC—this section, the procedure for sizing the water supply system shall be determined in accordance with the plumbing code.

503.2 Total Demand Load. The total demand load shall be the sum of the supply demand load calculated in accordance with Section 502.2 and the continuous demand load calculated in accordance with Section 502.3 for the building supply, branches, risers, and fixture branches as applicable.

503.3 Determining Pipe Diameters. After determining the permissible friction loss per 100 feet of pipe and the total demand loads in accordance with Section A 104.0 503.2, and the demand flow in accordance with the Water Demand Calculator, the diameter of the building supply pipe, branches and risers shall be obtained from Chart A 105.1(1), Chart A 105.1(2), Chart A 105.1(3), Chart A 105.1(4), Chart A 105.1(5), Chart A 105.1(6), or Chart A 105.1(7) whichever is applicable, in accordance with Section A 105.0 and Section A 106.0 determined in accordance with Chart 503.3(1) through Chart 503.3(9). Velocities shall be in accordance with Section A 107.1. Appendix I Installation Standard 31-2014 of the 2021 UPC, Figure 3 and Figure 4 shall be permitted when sizing PEX systems.

(renumber remaining chapters)
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s

FRICTION LOSS IN HEAD (pounds-force per square inch) PER 100-FOOT LENGTH
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
FRICTION LOSS IN HEAD (pounds-force per square inch) PER 100-FOOT LENGTH

For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s

FRICITION LOSS IN HEAD (pounds force per square inch) PER 100 FOOT LENGTH

For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
CHART 503.3(8)
PRESSURE LOSS OF PEX TUBING AT 60°F

For SI units: °C = (°F-32)/1.8, 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
CHART 503.3(9)
PRESSURE LOSS OF PEX TUBING AT 120°F

For SI units: °C = (°F-32)/1.8, 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s

SUBSTANTIATION:
In response to the committee statement provided for rejecting Item #074, the Premise Water Supply System Design Task Group has generated a public comment to address concerns expressed. The charts, used for determining diameters of building supply pipe, branches, and risers, have been relocated to Chapter 5 as requested. This relocation offers applicable tools and provides additional guidance when implementing the Water Demand Calculator (WDC).

Section 503.3 (Determining Pipe Diameters) is the most appropriate location for referencing these charts as this section addresses the use of permissible friction loss and demand loads in conjunction with the provided sizing charts to determine pipe diameters.

The Technical Committee identified this as the only reason for rejection. Therefore, this public comment, along with the public comment submitted for Item #123, should resolve the concerns expressed during the last Technical Committee meeting.
Proposals

Item #: 079
WEStand 2023 Section: 503.1

SUBMITTER: Pat Lando
Recode

RECOMMENDATION:
Revise text

503.0 Permits.
503.1 General. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any composting toilet and urine diversion system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.

Exception: A urine reuse system that is entirely within the limits of a single-family residential property, whereas the beneficial uses are not for resale.

SUBSTANTIATION:
The preferred proposed text creates an exception for permitting non-commercial urine reuse systems where the urine reuse system is for the benefit of a single-family property. Obtaining a permit is a barrier for small-scale systems that pose little risk. This work was created under my direction as chair of the National Gold Ribbon Commission for Urine Reuse.

This commission is a collaborative project to advance the regulation of urine reuse. The commission is comprised of over 100 urine reuse advocates from around the globe, including the leading expert scientists from Stanford, U-Michigan, U. Cal-Davis & Berkely, North Carolina State and Arizona State, EAWAG (Switzerland), Sweden and the Rich Earth Institute in Vermont.

I am also the executive director of Recode and Chair of the 2019 IAPMO’s WE•Stand; Alternative Toileting Task Group. Recode has been a long-time collaborator with IAPMO focusing on water conservation, reuse and sanitation.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed exception would prevent needed regulation of urine reuse systems for single-family residential properties. All urine reuse systems should have permitting requirements to ensure proper disposal methods and to meet minimum health and safety requirements. Additionally, requiring permits for these smaller systems promotes further development and expansion of regulations based on real-world applications.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 17 NEGATIVE: 11 NOT RETURNED: 2 CRAWFORD, WILLIAMS

Note: Item # 079 failed to achieve the necessary two-thirds affirmative vote of returned ballots. In accordance with Section 6.8.2 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard, a public comment is requested for this proposal. The Technical Committee will reconsider this proposal as a public comment.
EXPLANATION OF AFFIRMATIVE:

MANN: The substantiation states that there is "little risk"; that is enough to warrant an inspection.

EXPLANATION OF NEGATIVE:

ALLEN: I agree with John Koeller. This is a low risk situation and inline with many other permit exempt situations that are allowed across the country.

BARNES: I agree with many of the negative comments provided. There seems to be minimal risk to health and safety in small-scale applications. Especially when considered to the risks of using other common methods, such as animal manure or conventional fertilizers. The benefits of urine reuse in single-family property applications may outweigh the risks, and requiring permits would only serve to impede those benefits.

CUDAHY: Exempting this from jurisdictional oversight for single-family applications is reasonable. I am not sure it will see wide use.

KENDZEL: Support the comments already provided in support of rejecting the Committee's decision.

KLEIN: I think that this proposal is close but not quite there. Using urine on a residential occupancy happens regularly, but it is difficult to get everyone to pee on the right places at the right times. Diverting urine from a composting toilet makes a great deal of sense as it would seem to be much easier to manage its beneficial use. So, it should be allowed. The use of "whereas" in the second sentence seems very odd.

KOELLER: Do not agree with the committee statement that ALL such systems need regulation. First of all, urine is sterile. Second, why prohibit someone from using urine for fertilizing by setting onerous permitting requirements (which is what would happen!) that would result in 'bootleg' systems subject to local fines or other charges. This proposal was a reasonable accommodation to single-family residential properties and forestalled what would otherwise become more unnecessary government regulation.

LANDO: An established minimum amount of urine for beneficial use should be allowed outright within the WE•Stand. At what point is someone to urinate on their property for beneficial use?! This is the same argument that rainwater reuse had on its inception into the plumbing code.

LANSING: Exempting this from jurisdictional oversight for single-family applications is reasonable, low risk, and will likely promote further adoption.

LENGER: Disagree with committee’s findings. No regulation should be applied.

PAPE: I agree with Mr. John Koeller’s statements.

THOMPSON: I agree with the comments already submitted. This proposal may help encourage technological improvements in a practice that many rural households already apply on a regular basis. Repurposing urine for fertilization of existing landscape in single-family residential properties versus using potable water to flush seems like the most efficient solution when possible.

Request to accept the code change proposal as submitted by this public comment.
SUBSTANTIATION:
The original proposal has merit and should be accepted. The exception addresses urine reuse systems used only in single-family applications where the health and safety risks are minimal. Requiring a permit for these systems is impractical and reduces the number of urine reuse systems installed. The benefits of these systems outweigh the minimal potential risks.

PUBLIC COMMENT 2
Code Year: 2023 WEStand  Section #: 503.1  Item #: 079  Comment #: 2
SUBMITTER: Pat Lando
Rende
RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

503.0 Permits.
503.1 General. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any composting toilet and urine diversion system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.

Exceptions:
(1) A urine reuse system that is entirely within the limits of a single-family residential property with an approved sewage disposal system.
(2) Volume does not exceed 16 ounces (473 mL) per day.

SUBSTANTIATION:
The recommendations provided within this public comment are consistent with the following research findings:

2.) Gensch, Robert, and Dorothee Spuhler. "Urine Fertilisation (Small-Scale)." SSWM. Eawag (Swiss Federal Institute of Aquatic Science and Technology), May 26, 2019.
https://sswm.info/factsheet/urine-fertilisation-%28small-scale%29

"As a general rule of thumb, one can assume that 1 m² of cropland can receive 1.5L of urine per growing season (this quantity corresponds to the daily urine production of one person and to 40-110 kg N/ha). The urine of one person during one year is, thus, sufficient to fertilize 300 to 400 m² of cropland" (Gensch and Spuhler, 2019).

[Supporting documentation is provided in KAVI for TC review]

PUBLIC COMMENT 3
Code Year: 2023 WEStand  Section #: 503.1  Item #: 079  Comment #: 3
SUBMITTER: Pat Lando
Rende
RECOMMENDATION:
Accept as Modified
Request to replace the code change proposal by this public comment.

503.0 Permits.
503.1 General. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any composting toilet and urine diversion system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.

**Exception:** A urine reuse system that meets the following criteria:

1. Volume does not exceed 16 ounces (473 mL) per day;
2. Originates from a private residence;
3. Is used by the occupants of that residence for gardening, composting, or landscaping at the residence;
4. Does not discharge to surface waters of the state, a municipal separate storm sewer system, an industrial stormwater system or a stormwater management structure;
5. Provides groundwater and wellhead protection as regulated by the Authority Having Jurisdiction; and
6. Is not subject to flooding or high-water table conditions.

**SUBSTANTIATION:**
The recommendations provided within this public comment are consistent with the following research findings:


2.) Gensch, Robert, and Dorothee Spuhler. "Urine Fertilisation (Small-Scale)." SSWM. Eawag (Swiss Federal Institute of Aquatic Science and Technology), May 26, 2019.
   [https://sswm.info/factsheet/urine-fertilisation-%28small-scale%29](https://sswm.info/factsheet/urine-fertilisation-%28small-scale%29)

"As a general rule of thumb, one can assume that 1 m² of cropland can receive 1.5L of urine per growing season (this quantity corresponds to the daily urine production of one person and to 40-110 kg N/ha). The urine of one person during one year is, thus, sufficient to fertilize 300 to 400 m² of cropland" (Gensch and Spuhler, 2019).

[Supporting documentation is provided in KAVI for TC review]
Proposals

Item #: 082
WEStand 2023  Section: 505.4, 602.17, 1002.1, 1005.4, 1005.5, 1006.3, A 101.4, A 104.5.4

SUBMITTER: Jazmin Curiel
Self

RECOMMENDATION:
Revise text

505.0 Composting Toilet System Design.

505.4 Commodes. Commodes shall comply with Section 505.4.1 through Section 505.4.3.

(Section 505.4.1 through Section 505.4.3 are shown for information purposes only)

505.4.1 Odor. Commode design or use shall mitigate the infiltration of odors into the building during normal operation and in the event of temporary power failure.
505.4.2 Contact. Commodes shall transport excreta into the compost processor or contain excreta for transfer as designed according to the owner’s manual.
505.4.3 Vectors. Commodes shall limit vectors and prevent human contact except for regular maintenance as designed according to the owner’s manual.

602.0 Gray Water Systems.

602.17 Special Provisions. Special provisions for gray water systems shall comply with Section 602.17.1 and Section 602.17.2.

(Section 602.17.1 and Section 602.17.2 are shown for information purposes only)

602.17.1 Other Collection and Distribution Systems. Other collection and distribution systems shall be approved by the local Authority Having Jurisdiction, as allowed by Section 102.0 of this standard and the plumbing code.
602.17.2 Higher Requirements. Nothing contained in this chapter shall be construed to prevent the Authority Having Jurisdiction from requiring compliance with higher requirements than those contained herein, where such higher requirements are essential to maintain a safe and sanitary condition.

1002.0 Recirculation Systems.
1002.1 Pump Operation. Pump operation shall be in accordance with Section 1002.1.1 and Section 1002.1.2.

(Section 1002.1.1 and Section 1002.1.2 are shown for information purposes only)

1002.1.1 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.
1002.1.2 For Pumps Between Boilers and Storage Tanks. When used to maintain storage tank water temperature, recirculating pumps shall be equipped with controls limiting operation to a period from the start of the heating cycle to a maximum of 5 minutes after the end of the heating cycle. [ASHRAE 90.1:7.4.3.4]
1005.0 Mandatory Provisions.

1005.4 Hot Water System Design. **Hot water system design shall comply with Section 1005.4.1 and Section 1005.4.2.** (Section 1005.4.1 and Section 1005.4.2 are shown for information purposes only)

1005.4.1 Recirculation Systems. Recirculation systems shall meet the provisions in Section 1002.0.

1005.4.2 Maximum Volume of Hot Water. The maximum volume of water contained in hot water distribution lines between the water heater and the fixture stop or connection to showers, kitchen faucets, and lavatories shall be determined in accordance with Section 1003.7.

1005.5 Service Water Heating System Controls. **Temperature controls shall comply with Section 1005.5.1 and Section 1005.5.2.** (Section 1005.5.1 and Section 1005.5.2 are shown for information purposes only)

1005.5.1 Storage Temperature Controls. Temperature controls shall be provided that allow for storage temperature adjustment from 120°F (49°C) or lower to a maximum temperature compatible with the intended use.

**Exception:** When the manufacturers’ installation instructions specify a higher minimum thermostat setting to minimize condensation and resulting corrosion. [ASHRAE 90.1:7.4.4.1]

1005.5.2 Outlet Temperature Controls. Temperature controlling means shall be provided to limit the maximum temperature of water delivered from lavatory faucets in public facility restrooms to 110°F (43°C). [ASHRAE 90.1:7.4.4.3]

1006.0 Prescriptive Path.

1006.3 Heat Recovery for Service Water Heating. **Heat recovery systems shall comply with Section 1006.3.1 and Section 1006.3.2.** (Section 1006.3.1 and Section 1006.3.2 are shown for information purposes only)

1006.3.1 Condenser. Condenser heat recovery systems shall be installed for heating or preheating of service hot water provided all of the following are true:

1. The facility operates 24 hours a day.
2. The total installed heat rejection capacity of the water-cooled systems exceeds 6 000 000 Btu/h (1758 kW) of heat rejection.
3. The design service water heating load exceeds 1 000 000 Btu/h (293 kW). [ASHRAE 90.1:6.5.6.2.1]

**1006.3.2 Capacity.** The required heat recovery system shall have the capacity to provide the smaller of:

1. Sixty percent of the peak heat rejection load at design conditions.
2. Preheat of the peak service hot water draw to 85°F (29°C). [ASHRAE 90.1:6.5.6.2.2]

**Exceptions:**

(a) Facilities that employ condenser heat recovery for space heating with a heat recovery design exceeding 30 percent of the peak water-cooled condenser load at design conditions.

(b) Facilities that provide 60 percent of their service water heating from site-solar or site-recovered energy or from other sources.

A 101.0 General.

A 101.4 Product and Material Approval. **System components and materials shall be labeled in accordance with Section A 101.4.1 and Section A 101.4.2.** (Section A 101.4.1 and Section A 101.4.2 are shown for information purposes only)

A 101.4.1 Component Identification. System components shall be properly identified as to the manufacturer.

A 101.4.2 Plumbing Materials and Systems. Pipe, pipe fittings, traps, fixtures, material, and devices used in a potable rainwater system shall be listed or labeled (third-party certified) by a listing agency (accredited conformity assessment body) and shall comply with the approved applicable recognized standards referenced in this standard and the plumbing code, and shall be free from defects. Unless otherwise provided for in this standard, all materials, fixtures, or devices used or entering into the construction of plumbing systems, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval.
A 104.0 Design and Installation.

A 104.5 Rainwater Storage Tanks. (remaining text unchanged)

A 104.5.4 Opening and Access Protection. Rainwater tank openings shall comply with Section A 104.5.4.1 through Section A 104.5.4.3.

(Section A 104.5.4.1 through Section A 104.5.4.3 are shown for information purposes only)

A 104.5.4.1 Animals and Insects. Rainwater tank openings to the atmosphere shall be protected to prevent the entrance of insects, birds, or rodents into the tank.
A 104.5.4.2 Human Access. Rainwater tank access openings exceeding 12 inches (305 mm) in diameter shall be secured to prevent tampering and unintended entry by either a lockable device or other approved method.
A 104.5.4.3 Exposure to Sunlight. Rainwater tank openings shall not be exposed to direct sunlight.

SUBSTANTIATION:
The above sections are all being modified for the same reason. Sections which are not headings should include provisional language. This aligns with the layout requirements of the Uniform Codes and adds clarity by calling out specific subsections which apply.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS:
AFFIRMATIVE: 27  ABSTAIN: 1  NOT RETURNED: 2  CRAWFORD, WILLIAMS

EXPLANATION OF ABSTAIN:
LANDO: I reject the use of the term grey water.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 704.0, 705.0, 805.0, D 201.0  Item #: 082

SUBMITTER: Jazmin Curiel  Self  Comment #: 1

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

704.0 Operation and Maintenance Manual.

704.1 General. An operation and maintenance manual shall be provided in accordance with Section 601.6 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.

705.0 Inspection.

705.1 General. 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.
805.0 Inspection.

805.1 General. 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.

D 201.0 Composting Toilet and Urine Diversion Inspection Checklist.
D 201.1 General. This section includes the inspection checklist form.

SUBSTANTIATION:
This public comment addresses additional conflicts between the WEStand and IAPMO's Manual of Style. The original proposal made updates to add provisional language for sections not serving as headings, and this public comment then addresses section headings which contain provisional language. These revisions are minor but necessary for consistency within the WEStand and compliance the layout requirements of IAPMO's Manual of Style.
Proposals

Item #: 085
WEStand 2023  Section: 506.6, 506.8, Appendix D

SUBMITTER: Markus Lenger
CleanBlu Innovations Inc.

RECOMMENDATION:
Revise text

506.0 Urine Diversion System Design.

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

506.8 Grade of Horizontal Piping. For single or dual commode systems, urine diversion piping shall be installed at a minimum grade of ½-inch per foot (in/ft) (41.7 mm/m), or 4 percent toward the point of disposal or storage. Where more than two commodes are connected to a urine diversion system, the urine diversion piping shall be installed at a minimum grade of 1/4-inch per foot (in/ft) (20.8 mm/m), or 2 percent toward the point of disposal or storage.

SUBSTANTIATION: The current language is overly restrictive as it requires all horizontal piping for urine diversion systems to be installed at a minimum grade of ½ inch per foot. In cases where there are more than two commodes connected to a urine diversion system, the increased grade is not necessary as there will be heavier flow and more efficient waste disposal. Since pipe sizing is required to be in accordance with plumbing code as specified in Section 506.6, installing the horizontal piping at a lower grade should be allowed.

COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC

506.0 Urine Diversion System Design.

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

506.8 Grade-Gradient of Horizontal Piping. For single or dual commode systems, urine diversion piping shall be installed at a minimum grade-gradient of ½-inch per foot (in/ft) (41.7 mm/m), or 4 percent toward the point of disposal or storage. Where more than two commodes are connected to a urine diversion system, the urine diversion piping shall be installed at a minimum grade-gradient of 1/4-inch per foot (in/ft) (20.8 mm/m), or 2 percent toward the point of disposal or storage.
**APPENDIX D**
**COMPOSTING TOILET AND URINE DIVERSION INSPECTION CHECKLIST**

D 201.0 Composting Toilet and Urine Diversion Inspection Checklist. This section includes the inspection checklist form.

**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-gradient 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.

(portion of checklist not shown remains unchanged)

**COMMITTEE STATEMENT:**
The proposal is being modified to provide needed clarity and to remove insufficient piping slopes. The WE•Stand currently uses the term “grade” to describe either a required gradient or the construction level relative to the ground.

There is confusion with the provisions and whether they apply to only gravity drainage systems relying on a gradient (slope) or whether the systems also address a drainage system above a certain height from ground level (grade). In order to clarify this differentiation, Section 506.8 and Section D 201.0 are being revised to use the term “gradient” rather than “grade.”

Furthermore, the last sentence of Section 506.8 related to 1/4 inch per foot gradient is being stricken. The 1/4 inch per foot slope is insufficient for urine diversion piping as it does not ensure the required minimum flow velocity of 2 feet per second which is needed to produce a scouring effect in the piping for self-cleaning. Therefore, the section will only retain the existing 1/2 inch per foot slope requirement.

**TOTAL ELIGIBLE TO VOTE:** 30

**VOTING RESULTS:**

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<th>NOT RETURNED</th>
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CRAWFORD, WILLIAMS

**Appended Comments**

**PUBLIC COMMENT 1**

**Code Year:** 2023 WEStand  **Section #:** 209.0  **Item #:** 085

**SUBMITTER:** Jim Majerowicz  
Plumbers Local Union 130 U.A.

**RECOMMENDATION:**
Accept as Modified
Request to accept the code change proposal as modified by this public comment.

209.0 - G -
Gradient. The degree of inclination, or slope, of installed piping.

SUBSTANTIATION:
A definition for “gradient” is needed to support the amendments made by the Technical Committee on Item #085. This terminology further clarifies that the WEStand only uses “gradient” when referring to slope requirements.

PUBLIC COMMENT 2

Code Year: 2023 WEStand  Section #: 506.8  Item #: 085
SUBMITTER: Jazmin Curiel Self
Comment #: 2
RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

506.0 Urine Diversion System Design.

506.8 Gradient of Horizontal Piping. Urine diversion piping shall be installed at a minimum gradient of ½-inch per foot (in/ft) (41.7 mm/m), or 4 percent toward the point of disposal or storage. **Exception:** Urine diversion piping shall be permitted to be installed at a minimum gradient of ¼-inch per foot (in/ft) (20.8 mm/m), or 2 percent toward the point of disposal or storage where the following conditions are met:
1. The number of commodes connected to the urine diversion system is more than two and not exceeding eight,
2. The minimum gradient required by this section is impractical for installation,
3. The urine diversion piping is sized in accordance with Section 506.6, and
4. Where approved by the Authority Having Jurisdiction.

(shown for information purposes only)

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

SUBSTANTIATION:
There are circumstances in which the required minimum gradient is impractical for installation, and an exception should be provided to address such situations. Allowing a smaller slope when a urine diversion system is connected to more than one commode ensures sufficient flow through the urine diversion piping and allows for self-cleaning. The additional requirements to qualify for the exception are that the 4% slope be impractical for installation, pipe sizes comply with Section 506.6 (Sizing), and that the smaller slope be first approved by the Authority Having Jurisdiction.

Slopes should be able to be adjusted as long appropriate pipe sizes are used. This is necessary to ensure that urine diversion systems that are capable of meeting sufficient flow are permitted by this standard. The plumbing code also provides an exception for horizontal drainage piping where the slopes required are impractical due to structural features. This exception also requires adequate pipe sizing and approval by the Authority Having Jurisdiction.
Proposals

Item #: 086
WEStand 2023  Section: 506.7

SUBMITTER: Pat Lando
Recode

RECOMMENDATION:
Revise text

506.0 Urine Diversion System Design.

506.7 Traps. Fixtures discharging into urine diversion piping connected to the plumbing drainage system shall be trapped and vented according to the plumbing code with a backflow seal.

SUBSTANTIATION:
Urine reuse systems must take extra precautions to prevent odors, fouling and clogging from occurring. Under normal conditions, raw urine quickly hydrolyzes, forming a precipitate that builds into a hard scale’ causing pipes to foul. A standard plumbing method to contain odors is the use of a P-trap or liquid sump. Because P-traps and sumps work by using liquid as a means of preventing odors from backflowing, it then becomes a place for urine to collect, hydrolyze and foul the plumbing.

The proposed language allows a greater selection of backflow traps to be used. Waterless urinals have seen great success in silicon mechanical backflow seals. (See Figure 1 and Figure 2 below.) However, under the current plumbing code, a mechanical backflow device or check valve can not be used without a liquid “P-trap” or sump.

Figure 1 - Silicon Check Valve (New)
As documented in 2022 CalTrans Waterless Urinal Study by Dr. Harold Leverenz, UC-Davis, waterless urinals that rely upon a liquid P-trap or sump are far more likely to foul and clog faster than a mechanical check valve that does not rely upon liquid for a backflow seal. (See Figure 3 and Figure 4 below.)
This proposal was created under my direction as chair of the National Gold Ribbon Commission for Urine Reuse. This commission is a collaborative project to advance the regulation of urine reuse. The commission is comprised of over 100 urine reuse advocates from around the globe, including the leading expert scientists from Stanford, U-Michigan, U. Cal-Davis & Berkely, North Carolina State and Arizona State, EAWAG (Switzerland), Sweden and the Rich Earth Institute in Vermont. I am also the executive director of Recode and Chair of the 2019 IAPMO's WE•Stand; Alternative Toileting Task Group. Recode has been a long-time collaborator with IAPMO focusing on water conservation, reuse and sanitation.

[Supporting documentation is provided in KAVI for TC review]

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**
The WE•Stand refers the user to the plumbing code for fixture trap requirements. The language in Section 506.7 does not clearly designate that the provided trap requirements are explicit to waterless urinals, and it is unclear as to which fixtures are connected to the plumbing drainage system. Due to these concerns as well as the existing blockage issues associated with urine diversion systems, the proposal is being rejected.

**TOTAL ELIGIBLE TO VOTE:** 30

**VOTING RESULTS:** AFFIRMATIVE: 25  NEGATIVE: 3  NOT RETURNED: 2  CRAWFORD, WILLIAMS

**EXPLANATION OF AFFIRMATIVE:**

**ALLEN:** I agree with Edward Osann's comment.

**KENDZEL:** I agree with Edward Osann that the proposal has merit. However, the main issue appears to be related to the device not complying with the existing UPC. Perhaps this can be better addressed by updating the UPC.

**KLEIN:** Wording needs to be improved during public comment.

**OSANN:** The proposal has merit. More precise wording should be submitted via public comment to respond to the Committee's objections.

**EXPLANATION OF NEGATIVE:**

**LANDO:** The committee's statement is not correct in part because there was a lot of confusion in the room which I believe stemmed from a lack of understanding and joking about "commodes" and the different terms for ecological sanitation toilets. The Committee statement should have only referenced the confusion over if the trap could be installed "according to plumbing code" OR [with] "a backflow seal."
- The discussion over the [struvite] blockage issues was how a backflow seal performed better than a trap seal system. This supports the proposal.
- The lack of specificity referencing "use by a waterless urinal" in the committee's statement was not relevant since this trap could apply to fixtures approved under Chapter 5, such as urinals, waterless urinals or urine diverting dry toilets. Listing the specific fixture here would not be in practice with the WE•Stand format and not complete in practice.

**LANSGING:** I agree with the proponent's statement. Backflow seals are an important component for urine diversion systems.

**LENGER:** I agree with Pat Lando.
PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 506.7  Item #: 086
SUBMITTER: Pat Lando  Recode  Comment #: 1

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

506.0 Urine Diversion System Design.

506.7 Traps. Fixtures discharging into urine diversion piping connected to the plumbing drainage system shall be trapped and vented according to the plumbing code. Urine diversion fixtures discharging into piping shall be protected with a vapor backflow seal.

SUBSTANTIATION:
Section 506.7 (Traps) refers specifically to traps for urine diversion systems, and no other sections of the WEStand address such traps. The language has been edited to make clear that this fixture and trap requirement is specific to urine diversion systems, and the phrases “plumbing drainage system” and “trapped and vented” have been removed to prevent misinterpretation.
Item #: 088
WEStand 2023 Section: 506.12, 506.12.1

SUBMITTER: Markus Lenger
CleanBlu Innovations Inc.

RECOMMENDATION:
Revise text

506.0 Urine Diversion System Design.

506.12 Urine Storage Tanks. Urine storage tanks greater than 5 gallons (19 L) shall be constructed and installed in accordance with Section 506.12.1 through Section 506.12.8506.12.9.

506.12.1 Total Storage Volume. The total required storage volume (V) for a urine diversion system shall be determined in accordance with Equation 506.12.1. The use of multiple storage tanks to meet the required total storage volume shall be permitted.

\[
V = 0.4 \times N \times t \times \frac{h}{24} \quad \text{(Equation 506.12.1)}
\]

Where:
- \( h \) = number of hours where the system is accessible to users, hours per day
- \( N \) = number of expected users
- \( t \) = duration of storage time, days
- \( V \) = total required volume, gallons (L)

For SI units: 1 gallon = 3.785 L,
\[
V = 1.5 \times N \times t \times \frac{h}{24}
\]

(SUBSTANTIATION)

A method of determining the required storage volume for a urine diversion system is needed to prevent overflow and unsanitary conditions. This formula accounts for the average urine production per person, expected number of users, and required storage time. The equation is explicit to the collection of human urine as the coefficient was derived from the average urine produced per person per day.

Urine collection systems can be connected to a single storage tank or multiple depending on the size of the tank and expected volume of urine over a specified time period. Overall, this equation is simple to use and prevents inadequate sizing of urine storage tanks.

Supporting documentation for the proposed equation may be accessed via the following link:

COMMITTEE ACTION: ACCEPT AS SUBMITTED
506.0 Urine Diversion System Design.

506.12 Urine Storage Tanks. Urine storage tanks greater than 5 gallons (19 L) shall be constructed and installed in accordance with Section 506.12.1 through Section 506.12.9.

506.12.1 Total Storage Volume. The total required storage volume \( V \) for a urine diversion system shall be determined in accordance with Equation 506.12.1. The use of multiple storage tanks to meet the required total storage volume shall be permitted.

\[
V = 0.444 A \times N \times t \times \frac{h}{24} \quad \text{(Equation 506.12.1)}
\]

Where:
- \( A = 0.4 \)
- \( h \) = number of hours where the system is accessible to users, hours per day
- \( N \) = number of expected users
- \( t \) = duration of storage time, days
- \( V \) = total required volume, gallons (L)

For SI units: 1 gallon = 3.785 L, \( A = 1.5 \)

\[
V = 1.5 N t h / 24
\]

COMMITTEE STATEMENT:
An editorial revision was made to clarify the use IP versus SI units when solving Equation 506.12.1. The addition of coefficient "A" and the removal of "(L)" offers such clarity for the end user and prevents incorrect use of units.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS:  AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 506.12  Item #: 088

SUBMITTER: Pat Lando  Recode  Comment #: 1

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

506.0 Urine Diversion System Design.

506.12 Urine Storage Tanks. Urine storage tanks greater than 65 gallons (194 L), 55 gallons (208 L), and having an application area of not less than 1150 square feet (106.8 m²) shall be constructed and installed in accordance with Section 506.12.1 through Section 506.12.9.

SUBSTANTIATION:
A minimum storage volume to allow small non-commercial urine reuse for beneficial use is essential to ensuring safe practices. Many practitioners need to store urine for at least "a few days" prior to application in order for hydrolysis to naturally occur. Increasing the storage time, temperature, and volume all aid in natural hydrolysis and pasteurization making the urine safer to apply.
Limiting the size of storage is a good method to prevent spills that may pollute or become a nuisance, and thus a 55-gallon drum is a reasonable size to limit this practice. For example, a 55-gallon drum would hold a maximum of 2.3 pounds of Nitrogen which is normally applied to 1,150 square feet of turf grass.

There are many documents supporting this information. Two of the leading references are as follows:

2.) Gensch, Robert, and Dorothee Spuhler. “Urine Fertilisation (Small-Scale).” SSWM. Eawag (Swiss Federal Institute of Aquatic Science and Technology), May 26, 2019.
https://sswm.info/factsheet/urine-fertilisation-%28small-scale%29

“As a general rule of thumb, one can assume that 1 m$^2$ of cropland can receive 1.5L of urine per growing season (this quantity corresponds to the daily urine production of one person and to 40-110 kg N/ha). The urine of one person during one year is, thus, sufficient to fertilize 300 to 400 m$^2$ of cropland” (Gensch and Spuhler, 2019).

[Supporting documentation is provided in KAVI for TC review]
Item #: 092
WEStand 2023  Section: 506.13.1

SUBMITTER: Markus Lenger
CleanBlu Innovations Inc.

RECOMMENDATION:
Add new text

506.0 Urine Diversion System Design.

506.13 Maintenance Plan. (remaining text unchanged)
506.13.1 Pipe Cleaning. Urine diversion piping shall be cleaned using one of the following:
(1) Acetic acid,
(2) Citric acid,
(3) Sodium hydroxide,
(4) Suitable biodegradable surfactant, or
(5) Other cleaning agents approved by the Authority Having Jurisdiction.

SUBSTANTIATION:
The use of appropriate cleaning agents is necessary to ensure that precipitates collected within the urine diversion piping are removed. In systems where urine is diluted, the formation of dissolved salts can potentially cause blockages in the piping system if not cleaned properly.

Acetic acid and citric acid are organic compounds that are powerful enough to dissolve mineral deposits and kill bacteria. Sodium hydroxide is a commonly used alkaline cleaning agent which can dissolve protein based deposits and has decent disinfection properties. In order to prevent overly restrictive cleaning agent requirements, option (5) has been included.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as the language is unenforceable and only permits the use of one of the listed cleaning agents. In order to avoid this limitation, the phrasing "one or more of the following" would be better suited. Furthermore, the language should specify that such information is to be included within the pipe cleaning schedule.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS:  AFFIRMATIVE: 27  ABSTAIN: 1  NOT RETURNED: 2  CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:
ALLEN: I agree with John Koeller, a few edits will fix this one.
KOELLER: A bit of minor editing will fix this one.

EXPLANATION OF ABSTAIN:
LANDO: The proposal should be revised "one or more of the following" cleaning products.
PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 506.13 - 506.13.1
SUBMITTER: Pat Lando Recode

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

506.0 Urine Diversion System Design.

506.13 Maintenance Plan. Every urine diversion system shall have a maintenance plan supplied to the building owner that includes both a pumpout schedule and contract, or an onsite discharge plan. The maintenance plan shall also include a pipe cleaning schedule.

506.13.1 Contents of Maintenance Plan. The maintenance plan shall include the following information:
(1) Either a pumpout schedule and a contract, or an onsite discharge plan;
(2) A pipe cleaning schedule; and
(3) Designation of one or more of the following agents used for pipe cleaning:
   (a) Acetic acid,
   (b) Citric acid,
   (c) Sodium hydroxide,
   (d) Suitable biodegradable surfactant, or
   (e) Other cleaning agents approved by the Authority Having Jurisdiction.

SUBSTANTIATION:
The proposed code changes are necessary to ensure that maintenance plans for urine diversion systems are provided to the building owner and that they include information pertaining to pumpout, discharge, pipe cleaning schedules, and approved cleaning agents.
Item #: 099

WEStand 2023 Section: 602.6.1

SUBMITTER: Laura Allen
Greywater Action

RECOMMENDATION:
Add new text

602.0 Gray Water Systems.

602.6 Backwater Valves. (remaining text unchanged)

602.6.1 Cleanout Labeling. Cleanouts for drains that pass through a backwater valve shall be clearly identified with a permanent label stating: "BACKWATER VALVE DOWNSTREAM"

SUBSTANTIATION:
Cleanouts for drains that pass through a backwater valve are already required to be labeled this way in the UPC. I think including the requirement here is important to call people's attention to this since we're requiring them to install backwater valves for gray water systems.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 28 NOT RETURNED: 2 CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand Section #: 204.0

SUBMITTER: Jim Majerowicz
Plumbers Local Union 130 U.A.

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

204.0 – B –
Backwater Valve. A device installed in a drainage system to prevent reverse flow.

SUBSTANTIATION:
This definition for "backwater valve" matches what is published in the plumbing code. Providing a clear and consistent definition further supports Section 602.6.1 (Cleanout Labeling) and offers additional guidance to users of the WEStand.
Item #: 107
WEStand 2023 Section: Chapter 8

SUBMITTER: David Gordon
Chair, WE-Stand Onsite Gray Water Treatment Task Group

RECOMMENDATION: Add new text

CHAPTER 8
ONSITE GRAY WATER TREATMENT SYSTEMS

801.0 General.
801.1 Applicability. The provisions of this chapter shall apply to the design, installation, construction, and maintenance of residential and commercial onsite gray water treatment systems for non-potable reuse.
801.2 Allowable Use of Gray Water. Where approved or required by the Authority Having Jurisdiction, treated gray water shall be permitted to be used in lieu of potable water for uses such as, but not limited to, cooling towers, water closets, urinals, clothes washers, and surface irrigation. Gray water systems used for subsoil irrigation shall comply with Section 602.0.

802.0 System Design.
802.1 Requirements. Onsite gray water treatment systems shall be designed in accordance with this chapter by a registered design professional. Systems shall meet the design, construction, and performance requirements of Section 802.1.1 or Section 802.1.2.
802.1.1 Listed Devices and Equipment. Devices or equipment used to treat onsite treated gray water in order to maintain the minimum water quality requirements determined by the Authority Having Jurisdiction shall be listed and labeled (third-party certified) by a listing agency (accredited conformity assessment body) or approved for the intended application. Devices or equipment used to treat onsite treated gray water for use in water closet and urinal flushing, surface irrigation and similar applications shall comply with IAPMO IGC 324, NSF/ANSI 350, or as approved by the Authority Having Jurisdiction.
802.1.2 Alternative Design Systems. Where approved by the Authority Having Jurisdiction, onsite gray water treatment systems for residential and commercial applications shall comply with the provisions of Section 802.2 through Section 805.0.

802.2 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any onsite gray water treatment system within a building or on a premises without first obtaining a permit to do such work from the Authority Having Jurisdiction.
802.2.1 Plumbing Plan Submission. No permit for any onsite gray water treatment system shall be issued until complete plumbing plans, with appropriate data satisfactory to the Authority Having Jurisdiction, have been submitted and approved.
802.2.2 System Changes. No changes or connections shall be made to either the onsite gray water treatment system or the potable water system without approval by the Authority Having Jurisdiction.
802.3 Component Identification. System components shall be properly identified as to the manufacturer.
802.4 Material Compatibility. Gray water 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.
802.5 Log Reduction Targets. Gray water treatment systems shall be designed to meet the log reduction targets as set forth in Table 802.5. To meet the log reduction in Table 802.5, treatment processes used in gray water systems shall comply with Section 802.7 for validation or be operated according to conditions approved by the Authority Having Jurisdiction.
TABLE 802.5
LOG REDUCTION TARGETS FOR 10^{-4} INFECTIONS PER PERSON PER YEAR BENCHMARKS FOR GRAY WATER TREATMENT SYSTEMS

<table>
<thead>
<tr>
<th>WATER USE SCENARIO</th>
<th>ENTERIC VIRUSES</th>
<th>PARASITIC PROTOZOA</th>
<th>ENTERIC BACTERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor Use</td>
<td>5.5</td>
<td>4.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Indoor Use</td>
<td>6.0</td>
<td>4.5</td>
<td>3.5</td>
</tr>
</tbody>
</table>

802.6 Effluent Water Quality Parameters. Gray water treatment systems shall be designed to meet the effluent water quality parameters for water closet and urinal fixture use listed in Table 802.6.

TABLE 802.6
EFFLUENT WATER QUALITY PARAMETERS FOR WATER CLOSET AND URINAL FIXTURE USE

<table>
<thead>
<tr>
<th>MINIMUM</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkalinity</td>
<td>20 mg/L</td>
</tr>
<tr>
<td>TDS</td>
<td>0 mg/L</td>
</tr>
<tr>
<td>Turbidity</td>
<td>0 NTU</td>
</tr>
<tr>
<td>pH</td>
<td>6.0</td>
</tr>
<tr>
<td>Odor</td>
<td>Non-Offensive</td>
</tr>
<tr>
<td>Oily Film and Foam</td>
<td>Visual Non-detectable</td>
</tr>
<tr>
<td>Free Chlorine Residual</td>
<td>N/A</td>
</tr>
<tr>
<td>Combined Chlorine</td>
<td>N/A</td>
</tr>
<tr>
<td>Chloramines</td>
<td>N/A</td>
</tr>
</tbody>
</table>

802.7 Validation. Where required by the Authority Having Jurisdiction, treatment processes shall be tested to verify the pathogen reduction performance. The treatment processes shall be validated through third-party component validation or field verification using challenge testing. The results of the third-party component validation and/or challenge testing 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.

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

802.9 Monitoring Requirements. Monitoring of gray water treatment systems shall be based on the risk level in accordance with Table 802.9(1). The parameters listed in Table 802.9(2) shall be monitored by sensors placed in the effluent of the system and connected to a smart controller. The smart controller shall activate an alarm when the parameters in Table 802.9(2) are outside the specifications and shall shut the system down when the alarm is not acknowledged after a period of 8 hours has elapsed. For Category 2, quarterly grab samples shall be taken out of the effluent and analyzed by an accredited lab. The sensors' accuracy and response shall be validated upon commissioning of the system by an independent third party.

TABLE 802.9(1)
RISK LEVELS

<table>
<thead>
<tr>
<th>RISK LEVEL</th>
<th>TREATED WATER USAGE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Surface Irrigation</td>
</tr>
<tr>
<td>2</td>
<td>Water closets, urinals, clothes washers</td>
</tr>
</tbody>
</table>

* See Section 801.2 for other uses approved by the Authority Having Jurisdiction.
### Table 802.9(2) Monitoring Parameters

<table>
<thead>
<tr>
<th>Category</th>
<th>Parameters To Be Monitored</th>
<th>Validation Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turbidity, ORP, UV intensity (if used)</td>
<td>IGC 324 - Sensor validation procedure using 5.4.1.1 (a), (b), (c), and (d), as applicable</td>
</tr>
<tr>
<td>2</td>
<td>Turbidity, ORP, UV intensity (if used), pH, Quarterly lab Sample for Total Coliform</td>
<td></td>
</tr>
</tbody>
</table>

### 802.10 System Requirements

The design and installation of onsite gray water treatment systems shall meet the requirements of Section 802.10.1 through Section 802.10.8.

**802.10.1 Connections to Potable or Reclaimed (Recycled) Water Systems.** Gray water 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 gray water treatment system provided the potable or reclaimed (recycled) water supply connection is protected by an airgap.

**802.10.2 Bypass Connection.** A bypass shall be provided for the input connection to the gray water treatment system. The bypass shall be a diverter valve normally open to the gray water 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.

**802.10.3 Overflow Connection.** Gray water 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.

**802.10.4 Near Underground Potable Water Pipe.** Onsite treated gray water pipes run or laid in the same trench as potable water pipes shall have 12 inches (305 mm) minimum vertical and horizontal separation when both pipe materials are approved for use within a building. Where piping materials do not meet this requirement the minimum separation shall be increased to 60 inches (1524 mm). The potable water piping shall be installed at an elevation above the onsite treated gray water piping.

**802.10.5 Fail-safe Mechanisms.** Gray water 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.

**802.10.6 Flow Meter Totalizer.** Buildings with gray water treatment systems shall include a flow meter totalizer on the treated gray water distribution system and a flow meter totalizer on the potable make-up water pipeline to the gray water treatment system.

**802.10.7 Cross-connection Inspection and Testing.** A cross-connection test is required in accordance with Section 601.11.2. 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.

**802.10.8 Water Pressure.** Onsite treated non-potable water systems supplying water to water closets, urinals, and trap primers shall be capable of delivering not less than 15 pounds-force per square inch (psi) (103 kPa) residual pressure at the highest and most remote outlet served. Where the water pressure in the onsite treated non-potable water supply system within the building exceeds 80 psi (552 kPa), a pressure reducing valve reducing the pressure to 80 psi (552 kPa) or less to water outlets in the building shall be installed.

### 803.0 Commissioning

**803.1 General.** Onsite gray water treatment systems shall be commissioned in accordance with the requirements of Section 803.1 through Section 803.5.

**803.2 Requirements.** Commissioning for gray water 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 gray water treatment systems as required by the Authority Having Jurisdiction.

**803.3 Plan.** The construction documents shall include the commissioning plan for the gray water treatment system. The commissioning plan shall be approved by the Authority Having Jurisdiction prior to commissioning the gray water treatment system. The commissioning plan shall include the following:

1. General project information,
2. Equipment to be tested, including the test methodology,
(3) Processes to be tested.
(4) Criteria or process for testing.
(5) Criteria or process for acceptance.
(6) Commissioning team contact information.
(7) Commissioning process activities, schedules, and responsibilities.
(8) Plans for the completion of functional performance testing, post-construction documentation and training, and the commissioning report.

803.4 Performance Testing. Performance tests shall verify that the installation and operation of the equipment of the gray water treatment system is in accordance with the approved plans and specifications. The performance test report shall include the equipment tested, the testing methods utilized, and proof of proper calibration of the equipment.

803.5 Commissioning Report. The commissioning report shall be submitted to the Authority Having Jurisdiction.

804.0 Operation and Maintenance Manual.
804.1 General. An operation and maintenance manual shall be provided in accordance with Section 601.6 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.

805.0 Inspection.
805.1 General. Field inspections shall take place during and after construction while the contractor is on site to verify that the gray water 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.

Note: IAPMO IGC 324 and NSF/ANSI 350 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The Onsite Gray Water Treatment Task Group proposes comprehensive requirements related to the water quality, monitoring, design, construction, commissioning, alteration, repair, and operation requirements of onsite gray water treatment systems for non-potable water reuse. These requirements for a properly designed system, together with appropriate construction, operation, and maintenance, will help ensure onsite gray water treatment systems will be implemented safely and reliably. Similar requirements are currently published in the most recent edition of the WE•Stand for stormwater and black water systems.

The Task Group proposes to incorporate health risk-based water quality requirements for onsite gray water treatment 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. Gray water 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 are 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 gray water 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 Task Group also proposes to incorporate a monitoring approach for onsite gray water treatment 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 Task Group 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.

The Task Group supports the use of a health risk-based approach to guide treatment and design requirements for onsite gray water treatment 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 should be noted that 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.

The following resources were used to develop the proposed text for onsite gray water treatment systems:
Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems:
https://www.nwri-usa.org/_les/ugd/632dc3_8831385f1c2f4bb1b2976b06719832ae.pdf?index=true

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:
http://uswateralliance.org/sites/uswateralliance.org/les/NBRC%20GUIDEBOOK%20FOR%20DEVELOPING%20ONWS%20REGULATIONS.pdf

San Francisco Department of Public Health Director’s Rules and Regulations Regarding the Operation of Alternate Water Source Systems:

COMMITTEE ACTION: ACCEPT AS SUBMITTED
TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS:  AFFIRMATIVE: 16  NEGATIVE: 9  ABSTAIN: 3  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Note: Item # 107 failed to achieve the necessary two-thirds affirmative vote of returned ballots. In accordance with Section 6.8.2 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard, a public comment is requested for this proposal. The Technical Committee will reconsider this proposal as a public comment.
EXPLANATION OF NEGATIVE:

BRABAND: Concur with Thomas Pape.

KLEIN: I agree with Thomas Pape and Markus Lenger.

KOELLER: Concur with Mr. Thomas Pape’s comments.

LANSING: Further revisions are needed prior to incorporating this into WE•Stand.

LENGER: Scientifically inaccurate - comparing apples to oranges.

PAPE: The use of log reductions for water quality requirements is completely useless unless it is used with pre-treatment water quality requirements. It ignores that fact that black water and rainwater will have radically different resulting qualities while both meet these log reductions. Stop this insanity!!

PREMER: Based on the comments, more discussion is needed.

TABAKH: This should be referred back to Task Group to address the concerns.

WHITE: I agree with concerns for log reductions as basis of water quality.

EXPLANATION OF ABSTAIN:

BARNES: Based on the comments, I agree that more discussion on this topic is needed.

CUDAHY: Based on the comments, I agree that more discussion on this topic is needed.

MCLEOD: More detailed discussion is needed to move forward.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: Chapter 8

SUBMITTER: David Gordon
Chair, WE-Stand Onsite Gray Water Treatment Task Group

RECOMMENDATION:
Accept as Submitted

Request to accept the code change proposal as submitted by this public comment.

SUBSTANTIATION:
The Onsite Gray Water Treatment Task Group proposes comprehensive requirements related to the water quality, monitoring, design, construction, commissioning, alteration, repair, and operation requirements of onsite gray water treatment systems for non-potable water reuse. These requirements for a properly designed system, together with appropriate construction, operation, and maintenance, will help ensure onsite gray water treatment systems will be implemented safely and reliably. Similar requirements are currently published in the most recent edition of the WE•Stand for stormwater and black water systems.

The Task Group proposes to incorporate health risk-based water quality requirements for onsite gray water treatment 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. Gray water 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 are 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 gray water 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 Task Group also proposes to incorporate a monitoring approach for onsite gray water treatment 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 Task Group 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.

The Task Group supports the use of a health risk-based approach to guide treatment and design requirements for onsite gray water treatment 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 should be noted that 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.

The following resources were used to develop the proposed text for onsite gray water treatment systems:


Proposals

Item #: 108

WEStand 2023  Section: Chapter 9

SUBMITTER: Billy Smith
Chair, WE-Stand Technical Committee

RECOMMENDATION:
Revise text

901.0 General.

901.1 Scope. The provisions of this chapter shall apply to the installation, construction, alteration, and repair of nonpotable rainwater catchment systems.

901.1.1 Allowable Use of Rainwater. Where approved or required by the Authority Having Jurisdiction, rainwater shall be permitted to be used in lieu of potable water shall be in accordance with the provisions of for the applications identified in this chapter.

901.7 Minimum Water Quality Requirements. The minimum water quality for rainwater catchment systems shall meet the applicable water quality requirements for the intended application as determined by the Authority Having Jurisdiction. Water quality for nonpotable rainwater catchment systems shall comply with Section 903.4.

Exceptions:
(1) Water treatment is not required for rainwater catchment systems used for aboveground irrigation with a maximum storage capacity of 360 gallons (1363 L).
(2) Water treatment is not required for rainwater catchment systems used for nonspray subsurface or drip irrigation.

901.9 System Controls. Controls for pumps, valves, and other devices that contain mercury that come in contact with rainwater supply are prohibited shall not be permitted.

901.10 Separation Requirements. All underground rainwater catchment service piping shall be separated from the building sewer in accordance with the plumbing code. Treated nonpotable water pipes shall have with a 12 inch (305 mm) minimum vertical and horizontal separation when both pipe materials are approved for use within a building. Where horizontal piping materials do not meet this requirement the minimum separation shall be increased to 60 inches (1524 mm). The potable water piping shall be installed at an elevation above the treated nonpotable water piping.

901.11 Abandonment. All rainwater catchment systems that are no longer in use or fails to be maintained in accordance with Section 901.5 shall be abandoned. Abandonment shall comply with Section 305.0 and Section 901.11.2.

901.11.1 General. An abandoned system or part thereof covered under the scope of this chapter shall be disconnected from the remaining systems, drained, plugged, and capped in an approved manner. All rainwater catchment systems that are no longer in use or fails to be maintained in accordance with Section 901.5 shall be abandoned.

901.11.2 Underground Tank. An underground water storage tank that has been abandoned or otherwise discontinued from use in a system covered under the scope of this chapter shall be completely drained and filled with earth, sand, gravel, concrete, or other approved material or removed in a manner satisfactory to the Authority Having Jurisdiction.

902.0 Nonpotable Rainwater Catchment Systems.

902.1 General. The provisions of this section shall apply to the installation, construction, alteration, and repair of rainwater catchment systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, irrigation, industrial processes, water features, cooling tower makeup and other uses approved by the Authority Having Jurisdiction. Additional design criteria can be found in the Rainwater catchment systems for collecting precipitation or rain from rooftops shall comply with ARCSA/ASPE 63 Standard.
902.2 Plumbing Plan Submission. No permit for any rainwater catchment system requiring a permit shall be issued until complete plumbing plans, with appropriate data satisfactory to the Authority Having Jurisdiction, have been submitted and approved.

902.8 Rainwater Catchment Water System Color and Marking Information. (remaining text unchanged)

903.2 Deactivation and Drainage for Cross-connection Test. Where any portion of a rainwater catchment system is installed within a building, The rainwater catchment system and the potable water system within the building shall be provided with the required appurtenances (e.g., valves, air or vacuum relief valves, etc.) to allow for deactivation or drainage as required for a cross-connection test in Section 903.14.2.

SUBSTANTIATION:
The revisions and additions to Chapter 9 (Nonpotable Rainwater Catchment Systems) provide necessary improvements for clarity and enforceability of provisions. All modifications correlate with the plumbing code.

Additionally, Section 901.11 (Abandonment) has been updated to include necessary information for abandonment of nonpotable rainwater catchment systems. Although this language appears in Chapter 3 (General Regulations), it is important to also provide such requirements within Chapter 9. For these reasons, the proposed modifications improve the WE•Stand and should be included.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as the existing language is preferred. The language gathered from Section 305.0 (Abandonment) applies to all systems addressed within the standard and therefore does not need to be repeated. There is also concern with the varying interpretations of the term “abandonment.”

The Technical Committee agrees that a definition for “abandonment” would be beneficial within the WE•Stand. Additionally, Section 902.1 only references ARCSA/ASPE 63, and the Technical Committee prefers that other applicable industry standards be referenced for nonpotable rainwater catchment systems.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 27 NEGATIVE: 1 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF NEGATIVE:

SOVOCOOL: I think the author is probably right in recognizing that more detail on what to do for abandonment will help water purveyors have more comfort with going this direction.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand Section #: Chapter 9, Table 1201.1 Item #: 108

SUBMITTER: Monte Myers Self

RECOMMENDATION: Accept as Modified

Request to replace the code change proposal by this public comment.

901.0 General.

901.1 Scope. The provisions of this chapter shall apply to the installation, construction, alteration, and repair of nonpotable rainwater catchment systems.
901.1 Allowable Use of Rainwater. Where approved or required by the Authority Having Jurisdiction, rainwater shall be permitted to be used in lieu of potable water in accordance with the provisions of the applications identified in this chapter.

901.7 Minimum Water Quality Requirements. The minimum water quality for rainwater catchment systems shall meet the applicable water quality requirements for the intended application as determined by the Authority Having Jurisdiction. Water quality for nonpotable rainwater catchment systems shall comply with Section 903.5.

Exceptions:
(1) Water treatment is not required for rainwater catchment systems used for aboveground irrigation with a maximum storage capacity of 360 gallons (1363 L).
(2) Water treatment is not required for rainwater catchment systems used for non-spray subsurface or drip irrigation.

901.9 System Controls. Controls for pumps, valves, and other devices that contain mercury that shall not come in contact with rainwater supply are prohibited.

901.10 Separation Requirements. All underground rainwater catchment service piping shall be separated from the building sewer in accordance with the plumbing code. Treated nonpotable water pipes shall be permitted to run or laid in the same trench as potable water pipes shall have with a 12 inch (305 mm) minimum vertical and horizontal separation when both pipe materials are approved for use within a building. Where horizontal piping materials do not meet this requirement the minimum separation shall be increased to 60 inches (1524 mm). The potable water piping shall be installed at an elevation above the treated nonpotable water piping.

902.0 Nonpotable Rainwater Catchment Systems.
902.1 General. The provisions of this section shall apply to the installation, construction, alteration, and repair of rainwater catchments systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, irrigation, industrial processes, water features, cooling tower makeup and other uses approved by the Authority Having Jurisdiction. Additional design criteria can be found in the Rainwater catchment systems for collecting precipitation or rain from rooftops shall comply with ARCSA/ASPE/ANSI 63 Standard, or other equivalent standards.

902.2 Plumbing Plan Submission. No permit for any rainwater catchment system requiring a permit shall be issued until complete plumbing plans, with appropriate data satisfactory to the Authority Having Jurisdiction, have been submitted and approved.

902.8 Rainwater Catchment Water System Color and Marking Information. Rainwater catchment systems shall have a colored background in accordance with the plumbing code. Rainwater catchment systems shall be marked or field-marked, in lettering in accordance with the plumbing code, with the words: “CAUTION: NONPOTABLE RAINWATER, DO NOT DRINK.”

903.3902.9 Deactivation and Drainage for Cross-connection Test. Where any portion of a rainwater catchment system is installed within a building, the rainwater catchment system and the potable water system within the building shall be provided with the required appurtenances (e.g., valves, air or vacuum relief valves, etc.) to allow for deactivation or drainage as required for a cross-connection test in Section 903.15.2.

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<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
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<tbody>
<tr>
<td>ARCSA/ASPE/ANSI 63-2013*</td>
<td>Rainwater Catchment Systems</td>
<td>902.1, A 104.9.1</td>
</tr>
</tbody>
</table>

Note: ARCSA/ASPE/ANSI 63 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
In attempts to address the Technical Committee’s reasons for rejecting Item #108, Section 901.11 (Abandonment) has been removed from the recommendation, and language has been added to allow the use of other equivalent standards for rainwater catchment systems within Section 902.1 (General).
PUBLIC COMMENT 2

Code Year: 2023 WEStand  Section #: 902.1, Table 1201.1  Item #: 108

SUBMITTER: Markus Lenger
Chair, WE-Stand Direct Potable Water Use Task Group

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

902.0 Nonpotable Rainwater Catchment Systems.
902.1 General. The provisions of this section shall apply to the installation, construction, alteration, and repair of rainwater catchments systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, irrigation, industrial processes, water features, cooling tower makeup and other uses approved by the Authority Having Jurisdiction. Additional design criteria can be found in the ARCSA/ASPE 63 Standard.

TABLE 1201.1
REFERRED STANDARDS

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
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<tbody>
<tr>
<td>ARCSA/ASPE/ANSI 63-2013</td>
<td>Rainwater Catchment Systems</td>
<td>902.1, A 104.9.1</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: ARCSA/ASPE/ANSI 63 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
Section 902.1 (General) is being revised to remove informative language from the mandatory body of the standard. Additionally, Table 1201.1 (Referenced Standards) has been updated to include the latest edition of ARCSA/ASPE/ANSI 63.
Proposals

Item #: 110
WEStand 2023  Section: 903.5 - 903.5.2, 903.5.4, 903.9, Table 1201.1

SUBMITTER: Billy Smith
Chair, WE-Stand Technical Committee

RECOMMENDATION:
Revise text

903.0 Design and Installation.

903.5 Rainwater Storage Tanks. Rainwater storage tanks shall comply with IAPMO/ANSI Z1002 be constructed and be installed in accordance with Section 903.5.1 through Section 903.5.7.

903.5.1 Construction. Rainwater storage shall be constructed of solid, durable materials not subject to excessive corrosion or decay and shall be watertight. Storage tanks shall be approved by the Authority Having Jurisdiction, provided such tanks comply with approved applicable standards.

903.5.2 Location. Rainwater storage tanks shall be permitted to be installed above or below grade.

(renumber remaining sections)

903.5.4 Below Grade. Rainwater storage tanks installed below grade shall be structurally designed to withstand all anticipated earth or other loads. Holding tank covers shall be capable of supporting an earth load of not less than 300 pounds per square foot (lb/ft²) (1465 kg/m²) when the tank is designed for underground installation. Below grade rainwater tanks installed underground shall be provided with manholes. The manhole opening shall not be less than 20 inches (508 mm) in diameter and located not less than 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.

903.9 Freeze Protection. Tanks and piping installed in locations subject to freezing shall be provided with an adequate approved means of freeze protection.

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
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</thead>
<tbody>
<tr>
<td>IAPMO/ANSI Z1002-2020*</td>
<td>Rainwater Harvesting Tanks</td>
<td>903.5</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: IAPMO/ANSI Z1002 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.
The revisions and additions to Chapter 9 (Nonpotable Rainwater Catchment Systems) provide necessary improvements for both clarity and inclusion of applicable industry standards. All modifications correlate with the plumbing code.

Section 903.5 (Rainwater Storage Tanks) is being modified to reference IAPMO Z1002 as this standard covers rainwater harvesting tanks and specifies requirements for design, materials, manufacture, performance, testing, and markings. Section 903.5.4 and Section 903.9 are being revised to remove unenforceable language from the mandatory body of the code.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
Requiring compliance with IAPMO/ANSI Z1002 is unnecessary and overly restrictive as it would limit the design and installation of rainwater harvesting tanks. There currently exists a variety of manufactured water storage tanks which are appropriate for use in rainwater catchment systems and are not listed to IAPMO/ANSI Z1002. Additionally, there is concern regarding the availability of manufactured rainwater harvesting tanks currently listed to this standard.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 20 NEGATIVE: 8 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF NEGATIVE:

BARNES: I agree that the use of product standards is appropriate.

CUDAHY: I agree with Jim Kendzel.

KENDZEL: The Committee substantiation goes against the basic philosophy of model codes and the use of national product consensus standards and third-party verification. Rainwater storage tanks are a critical component of rainwater catchment systems, and it is important to have nationally accepted standards that provide minimum requirements and third-party validation of those requirements. The thought that there are already products in the field performing well does not seem to provide justification for not requiring listing to minimum design and performance standards.

KLEIN: I agree with Jim Kendzel.

KOELLER: I concur with the comments of Mr. Jim Kendzel and therefore change my vote.

PREMER: I agree with Jim Kendzel as well, but adding, as this technology matures and more manufacturers make “tanks,” it is even more important to protect our systems. Thus, mandating adherence to basic standards.

SMITH: I agree that the use of product standards is appropriate.

WHITE: I agree that the use of product standards is appropriate.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 903.6 - 903.6.4, 903.10, Table 1201.1  Item #: 110
SUBMITTER: Chelsea Salaiz  Self  Comment #: 1

RECOMMENDATION: Accept as Modified
Request to replace the code change proposal by this public comment.

903.0 Design and Installation.

903.6 Rainwater Storage Tanks. Rainwater storage tanks shall comply with IAPMO/ANSI Z1002, or other equivalent standards, and shall be constructed and installed in accordance with Section 903.6.1 through Section 903.6.8. Rainwater storage shall be constructed of solid, durable materials not subject to excessive corrosion or decay and shall be watertight. Storage tanks shall be approved by the Authority Having Jurisdiction; provided such tanks comply with approved applicable standards:

903.6.1 Construction. Rainwater storage shall be constructed of solid, durable materials not subject to excessive corrosion or decay and shall be watertight. Storage tanks shall be approved by the Authority Having Jurisdiction; provided such tanks comply with approved applicable standards:

903.6.2 Location. (remaining text unchanged)

903.6.3 Above Grade. (remaining text unchanged)

903.6.4 Below Grade. Rainwater storage tanks installed below grade shall be structurally designed to withstand all anticipated earth or other loads. Holding tank covers shall be capable of supporting an earth load of not less than 300 pounds per square foot (lb/ft²) (1465 kg/m²) when the tank is designed for underground installation. Below grade rainwater tanks installed underground shall be provided with manholes. The manhole opening shall not be less than 20 inches (508 mm) in diameter and located not less than 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.

(renumber remaining sections)

903.10 Freeze Protection. Tanks and piping installed in locations subject to freezing shall be provided with an adequate means of freeze protection.

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<tbody>
<tr>
<td>IAPMO/ANSI Z1002-2020*</td>
<td>Standard for Rainwater Harvesting Tanks</td>
<td>903.6</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: IAPMO/ANSI Z1002 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
Based on the committee statement provided during the proposal stage, additional revisions have been included to allow other equivalent standards to be used for rainwater storage tanks. This revision prevents overly restrictive language regarding compliance requirements and permits the use of other standards that meet the qualifications of Section 301.1 (Alternate Materials, Designs, and Methods of Construction Equivalency).

To reiterate one of the comments published in the Report on Proposals, “Rainwater storage tanks are a critical component of rainwater catchment systems, and it is important to have nationally accepted standards that provide minimum requirements and third-party validation of those requirements.” For this reason, reference to IAPMO/ANSI Z1002 is being kept in the recommendation.

The other revisions within this public comment are needed to address the use of nonmandatory language in the mandatory body of the code. In order to improve enforceability and comply with IAPMO's Manual of Style, these changes should be accepted.
1003.0 Service Hot Water – Low-Rise Residential Buildings.

1003.7 Maximum Hot Water System Ratio. The ratio of the hot water system rectangle to the floor area shall not exceed 60 percent for single-story dwellings and shall not exceed 30 percent for dwellings two or more stories in height. These ratios shall apply to both attached and detached dwelling units.

210.0 - H -
Hot Water System Ratio. The ratio of the hot water system rectangle to the floor area of a dwelling.
Hot Water System Rectangle. The region of a dwelling that bounds the water heater, plumbing fixture fittings, and appliances which use hot water.

SUBSTANTIATION:
This "maximum hot water system ratio" is intended to promote efficient floor plan layouts to limit heating energy and water-use. Inefficient fixture locations will have long hot water wait times, resulting in greater water use and heating energy with no benefit to the user. The values of 60% and 30% here are achievable in common fixture arrangements in most dwellings, while prohibiting the most inefficient layouts.

In the below example, the red rectangle is drawn to match the boundary of where all fixtures are located. The green rectangles represent the portions of the dwelling where there are no fixtures located. When accounting for the red area with respect to the total of the green and red areas, it can be seen that 67% of this dwelling is covered by the red area, meaning plumbing fixtures are spread throughout 67% of the dwelling.

The "hot water system rectangle" is correlated to the amount of piping that will be used, which is also correlated to the volume between the water heater, or circulated piping in the case of a multifamily dwelling, to the fixture.

In support of the proposed new requirements, terminology has also been provided for "hot water system ratio" and "hot water system rectangle." Including these definitions aids users of the WE-Stand by offering an explanation of terms used.
Example: 1 story, 3BR/2BA, 1697 sqft (Fresno, CA) ~ 67% (1137 sqft)

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 27 NEGATIVE: 1 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF NEGATIVE:

WHITE: The rationale says that there is no benefit to users for exceeding this area; that is in the proponent's opinion. Users may indeed derive some benefit that they value. The 60% for single story and 30% for 2 stories or more is confusing. Are we really talking about the footprint?

A 1000 ft² single story would be allowed 600 ft², but a two story at 1000 ft² per floor gets 600 ft². Is that on two floors? Does a three story at 1000 ft² per floor get 900 ft²? Is that the footprint, or all floors in the rectangle? I believe this needs more work.
Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand Section #: 206.0, 210.0, 1003.7  Item #: 113
SUBMITTER: Jim Kendzel Chair, WE-Stand Premise Water Supply System Design Task Group

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

1003.0 Service Hot Water – Low-Rise Residential Buildings.

1003.7 Maximum Hot Water System Ratio. The ratio of the hot water system rectangle to the floor area of a dwelling footprint shall not exceed 60 percent for single-story dwellings and shall not exceed 30 percent for dwellings two or more stories in height. These ratios shall apply to both attached and detached dwelling units.

206.0 - D - Dwelling Unit Footprint. The area within the inside perimeter of the exterior walls of a dwelling unit.

210.0 - H - Hot Water System Ratio. The ratio of the hot water system rectangle to the floor area of a dwelling unit. Hot Water System Rectangle. The region of a dwelling that bounds the water heater, plumbing fixture fittings that supply hot water, and appliances which use hot water.

SUBSTANTIATION:
In response to the negative comment received on Item #113, the Premise Water Supply System Design Task Group reconvened to discuss and review potential areas of concern or confusion. As a result, the following recommendations were generated:

While the hot water system rectangle accounts for fixtures on all floors, the 60% area is only counted once and does not tally for each additional floor of the unit. Section 1003.7 (Maximum Hot Water System Ratio) has been revised to clarify this distinction.

Additionally, the definitions for “hot water system ratio” and “hot water system rectangle” have been updated to further support the revisions made to Section 1003.7 (Maximum Hot Water System Ratio). Since the intent of these provisions pertains to only hot-water distribution and improved efficiency, the phrase “plumbing fixture fittings that supply hot water” is being proposed within the terminology for “hot water system rectangle.”

It was also necessary to specify that the ratio calculations are to be determined using the hot water system rectangle and the “dwelling unit footprint” rather than the “floor area.” Using the floor area would account for the square footage inside the perimeter of the exterior walls of the building instead of the dwelling unit. This update prevents misinterpretations and miscalculations when determining the prescribed ratio. Further clarification has also been provided via the proposed definition for “dwelling unit footprint.”
Proposals

Item #: 115
WEStand 2023  Section: A 101.2, A 101.7, Table 1201.1

SUBMITTER: Billy Smith
Chair, WE-Stand Technical Committee

RECOMMENDATION:
Revise text

A 101.0 General.

A 101.2 System Design. Potable rainwater catchment systems complying with this appendix shall be designed by a registered design professional person registered, licensed, or person deemed competent by the Authority Having Jurisdiction to perform potable rainwater catchment system design work. Where required, rainwater catchment systems shall be seismically restrained against earthquakes in accordance with the building code.

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, EPA/600/R-12/618 contains recommended water reuse guidelines to assist regulatory agencies develop, revise, or expand alternate water source water quality standards.

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA/600/R-12/618-2012</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: EPA/600/R-12/618 does not meet the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The revisions to Section A 101.2 are needed to clarify that design must be completed by a registered design professional or person deemed competent by the AHJ. As defined in Chapter 2, a "registered design professional" is an individual who is registered or licensed by the laws of the state to perform such design work in the jurisdiction. Using the term "registered design professional" is also consistent with the language used in the remainder of the WE-Stand. For consistency and clarity, this change should be implemented. Furthermore, the new requirement for rainwater catchment systems to be seismically restrained offers a level of safety in the event of an earthquake. The proposed modifications are also consistent with the plumbing code. Section A 101.7 has also been updated to include the most recent edition of EPA's Guideline for Water Reuse. EPA/600/R-12/618 is a comprehensive, up-to-date document which provides water reuse guidelines in support of regulations developed by states, tribes, and other authorities. Due to significant growth in the application of reuse and important advances in reuse technologies, such guidelines are needed which specify minimum water quality to promote health and safety.
COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC

A 101.0 General.

A 101.2 System Design. Potable rainwater catchment systems complying with this appendix shall be designed by a registered design professional or person deemed competent by the Authority Having Jurisdiction to perform potable rainwater catchment system design work. Where required, rainwater catchment systems shall be seismically restrained against earthquakes in accordance with the building code.

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, EPA/600/R-12/618 contains recommended water reuse guidelines to assist regulatory agencies develop, revise, or expand alternate water source water quality standards.

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<tr>
<th>STANDARD NUMBER-YEAR</th>
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</tr>
</thead>
<tbody>
<tr>
<td>EPA/600/R-12/618-2012</td>
<td>Guidelines for Water Reuse</td>
<td>601.7, A 101.7</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

COMMITTEE STATEMENT:
The modification retains the current language in Section A 101.7 as the addition of EPA/600/R-12/618 does not improve the section and would only be applicable in the absence of water quality requirements.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 28 NOT RETURNED: 2 CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand Section #: A 101.7 Item #: 115
SUBMITTER: Chelsea Salaiz Self

RECOMMENDATION: Accept as Modified

Request to accept the code change proposal as modified by this public comment.

A 101.0 General.

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.

Note: In the absence of water quality requirements, EPA/600/R-12/618 contains recommended water reuse guidelines to assist regulatory agencies develop, revise, or expand alternate water source water quality standards.

Note: EPA/600/R-12/618 does not meet the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.
SUBSTANTIATION:
There are a few locations in which standards are referenced for use in the absence of requirements being provided by the Authority Having Jurisdiction. In cases where the Authority Having Jurisdiction offers no guidance and there exists available and appropriate standards which promote health and safety, such standards should be provided.

PUBLIC COMMENT 2

Code Year: 2023 WEStand  Section #: Table 1201.1, A 101.7, A 104.9.1  Item #: 115

SUBMITTER: Markus Lenger
Chair, WE-Stand Direct Potable Water Use Task Group

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

A 101.0 General.

A 101.7 Minimum Water Quality Requirements. The minimum water quality for all potable rainwater catchment systems shall be in accordance with ARCSA/APSE/ANSI 63 or shall meet the applicable water quality requirements as determined by the Authority Having Jurisdiction for private wells.

A 104.0 Design and Installation.

A 104.9 Roof Washer or Pre-Filtration System. Collected rainwater shall pass through a roof washer or prefiltration system before the water enters the rainwater storage tank. Roof washer systems shall comply with Section A 104.9.1 through Section A 104.9.4.

A 104.9.1 Size. The roof washer shall be sized to direct a sufficient volume of rainwater containing debris that has accumulated on the collection surface away from the storage tank.

Note: See The ARCSA/ASPE/ANSI 63 Standard contains for additional guidance on acceptable methods of sizing roof washers.

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCSA/ASPE/ANSI 63-20432020*</td>
<td>Rainwater Catchment Systems</td>
<td>902.1, A 101.7, A 104.9.1</td>
</tr>
</tbody>
</table>

Note: ARCSA/ASPE/ANSI 63 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
Reference has been made to ARCSA/ASPE/ANSI 63 (Rainwater Catchment Systems) as this standard establishes the minimum potable water quality parameters required at the point of use (POU) for harvested rainwater which are consistent with the potable water standards established by the U.S. EPA for drinking water.

Additionally, the parameters dictated by ARCSA/ASPE/ANSI 63 are consistent with those found in Table A 104.2.3 (Minimum System Maintenance Requirements) and therefore presents no conflict if referenced in Section A 101.7 (Minimum Water Quality Requirements).

The revision to Section A 104.9.1 (Size) is necessary to meet IAPMO’s Manual of Style. This modification identifies informative language as a “note” to the section and more appropriately directs users of the WEStand to ARCSA/ASPE/ANSI 63 for additional guidance on acceptable methods of sizing roof washers.
Item #: 116  WEStand 2023  Section: A 101.9, A 103.1 - A 103.2

SUBMITTER: Billy Smith  Chair, WE-Stand Technical Committee

RECOMMENDATION:
Revise text

A 101.0 General.

A 101.9 System Controls. Controls for pumps, valves, and other devices that contain mercury that come in contact with the water supply are prohibited shall be prohibited.

A 103.0 Potable Rainfall Catchment System Materials.
A 103.1 Collections Surfaces. The collection surface for potable applications shall be constructed of a hard, impervious material and shall be approved for potable water use. Roof eCoatings, paints, and liners placed on roof tops and ground surfaces which come into direct contact with rainwater shall comply with NSF Protocol P151.
A 103.1.1 Prohibited. Roof paints and coatings with lead, chromium, or zinc are prohibited shall be prohibited. Wood roofing material and lead flashing are prohibited shall be prohibited.
A 103.2 Rainwater Catchment System Drainage Materials. Gutters and downspouts used in rainwater catchment drainage systems shall comply with NSF Protocol P151, and leaders and conductors shall be listed to NSF 61. Materials used in rainwater catchment drainage systems, including gutters, downspouts, conductors, and leaders shall be in accordance with the requirements of the plumbing code for storm drainage.

SUBSTANTIATION:
Section A 103.1 is being modified to better reflect the applicability of NSF Protocol P151. Since this standard is being referenced, it is imperative that the items requiring compliance are consistent with the scope of the standard.

Section A 103.2 is being updated to remove reference to NSF Protocol P151 as this standard is appropriately addressed in Section A 103.1 for collection surfaces. Section A 103.2 pertains to system drainage materials, not collection/catchment materials, and should therefore be required to comply with the plumbing code for storm drainage. Furthermore, the change in phrasing from "are prohibited" to "shall be prohibited" improves code language.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as the Technical Committee disagrees with the use of storm drainage requirements for rainwater catchment system drainage. There is also confusion between material requirements for rainwater catchment systems and rainwater drainage systems. These requirements should be differentiated more clearly.

Also noted was the concern that plumbing systems require a level of freeze protection which may be overly restrictive and impractical for rainwater catchment systems.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS:  AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS
PUBLIC COMMENT 1

Appended Comments

SUBMITTER: Monte Myers
Self

RECOMMENDATION:
Accept as Modified

Request to **replace** the code change proposal by this public comment.

**A 101.0 General.**

**A 101.9 System Controls.** Controls for pumps, valves, and other devices that contain mercury **shall not** come in contact with the water supply are prohibited.

**A 103.0 Potable Rainfall Catchment System Materials.**

**A 103.1 Collections Surfaces.** The collection surface for potable applications shall be constructed of a hard, impervious material and shall be approved for potable water use. **Roof coatings, paints, and liners placed on roof tops and ground surfaces which come into direct contact with rainwater** shall comply with NSF Protocol P151.

**A 103.1.1 Prohibited.** Roof paints and coatings with lead, chromium, or zinc **shall be prohibited.** Wood roofing material and lead flashing are prohibited.

Note: NSF P151 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**SUBSTANTIATION:**

The recommendation has been modified to remove language that required materials used in rainwater catchment drainage systems to comply with the storm drainage requirements of the plumbing code.

Section A 103.1 (Collection Surfaces) is being modified to align with the scope of NSF P151. As stated within the scope of NSF P151, "this testing protocol covers gutters, barrier materials, and/or catchment surfaces (coatings, paints, lining, and liners) placed on roof tops and ground surfaces that come in direct contact with rainwater that is collected and used as drinking water." The designation of this standard, as shown on the document, is "NSF P151," and the "P" represents protocol.

Other revisions to Section A 101.9 (System Controls) and Section A 103.1.1 (Prohibited) have been made to comply with IAPMO's Manual of Style (i.e. the updated phrasing from "are prohibited" to "shall be prohibited").
Proposals

Item #: 117
WEStand 2023  Section: A 103.1

SUBMITTER: Laura Allen
Greywater Action

RECOMMENDATION:
Revise text

A 103.0 Potable Rainfall Catchment System Materials.
A 103.1 Collections Surfaces. The collection surface for potable applications shall be constructed of a hard, impervious material and shall be approved for potable water use. Roof coatings, paints, and liners shall comply with NSF Protocol P151.

SUBSTANTIATION:
There are no roofing materials approved for potable water use. Therefore, it does not make sense to require something that does not exist. The study referenced below shows several roofing materials are suitable to use for potable systems. The study recommends using a first flush diverter, filtration, and disinfection, which is consistent with the requirements in this appendix.

Effect of Roof Material on Water Quality for Rainwater Harvesting Systems – Additional Physical, Chemical, and Microbiological Data:

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The language pertaining to collection surfaces needs to be further developed to ensure safe use and approval for intended application. Although there are various materials which are appropriate for potable rainwater collection surfaces, water treatment and material compatibility must be considered together when designing these systems.

TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS:  AFFIRMATIVE: 28      NOT RETURNED:  2   CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1
Code Year: 2023 WEStand  Section #: A 103.1
SUBMITTER: Laura Allen
Greywater Action
RECOMMENDATION:
Accept as Modified
Request to replace the code change proposal by this public comment.

**A 103.0 Potable Rainfall Catchment System Materials.**

**A 103.1 Collections Surfaces.** The collection surface for potable applications shall be constructed of a hard, impervious material such as galvanized steel or ceramic tile. Roof materials containing lead, arsenic, biocides, or other similarly harmful materials shall be prohibited and shall be approved for potable water use. Roof coatings, paints, and liners shall comply with NSF Protect P151.

**Note:** NSF P151 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**SUBSTANTIATION:**

Common roofing materials for potable rainwater systems are metal (such as Kynar®-coated Galvalume® roof that was tested in the study referenced below) and tile. These roof materials are not approved specifically for potable use but are commonly used without problem. By amending Section A 103.1 (Collection Surfaces) to allow for safe and viable roofing materials, WEStand could be a viable standard to permit potable rainwater catchment systems. NSF Protocol 151 doesn’t cover roofing materials other than the roof coatings and liners so there is not an applicable standard for this situation (from my research). Other potable water approval standards cover tanks, pipes, fittings, etc. but not roofing materials.

This proposal is aligned with requirements of states that allow potable rainwater catchment systems. In the part of Washington, San Juan county, where potable rainwater systems are most common, the health department requires roof materials to be enameled metal, tile, or cement tile.

In Hawaii, the health department directs people to the state’s guidelines on rainwater catchment. This is what the guideline says, “The most common type of roofing material used for water catchment is galvanized metal that has been painted or enameled with a nontoxic paint. Some paint companies have paints that have been approved by the FDA for “incidental contact,” but they are not listed as “approved” for water collection. Other materials that could be used are concrete, terracotta tiles, slate, polycarbonate, and fiberglass. Paint used on the roofing material should not contain fungicides or other poisons that could leach into the water. Materials containing lead should not be used anywhere in the catchment system.”

**Sources:**

**Study:** Quality of roof-harvested rainwater – Comparison of different roofing materials

**Report:** Effect of Roof Material on Water Quality for Rainwater Harvesting Systems for the Texas Water Development Board . January 2010

**San Juan County Health and Human Services Rainwater Catchment Checklist:**


[Supporting documentation is provided in KAVI for TC review]
4. Materials Used. Items C-F must comply with NSF, FDA, or AWWA Drinking Water Standards for potable water (include model #, manufacturer and NSF, FDA, or AWWA certification):

A. Roofing Material (enameled metal, tile or cement tile): _____________

B. Rain gutters (PVC or enameled metal): _______________________

C. Pre-storage filtration (prior to storage tank): __________________

D. Water Storage Tanks: ________________________________

E. Filtration (must meet NSF Standard 53 or 58 for cyst removal – see Appendix A, page 4 Filtration for Household Use for specifics).

F. Disinfection (chlorination, ozone or ultraviolet [ozone and ultraviolet units must have a system failure warning device]): _____________
Proposals

Item #: 118
WEStand 2023  Section: A 103.2

SUBMITTER: Laura Allen
Greywater Action

RECOMMENDATION:
Revise text

A 103.0 Potable Rainfall Catchment System Materials.

A 103.2 Rainwater Catchment System Drainage Materials. Gutters and downspouts used in rainwater catchment drainage systems shall be made from seamless nonleaching metal, or plastic pipe that meets the requirements of NSF/ANSI 14 or NSF/ANSI/CAN 61, comply with NSF Protocol P151, and leaders and conductors shall be listed to NSF/ANSI/CAN 61.

Note: NSF/ANSI 14 and NSF/ANSI/CAN 61 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
There are no gutters that comply with NSF Protocol 151. Therefore, it does not make sense to require something that does not exist. As a reference, the publication titled, “Harvesting, Storing, and Treating Rainwater for Domestic Indoor Use” by the Texas Commission on Environmental Quality states the following:

“We recommend that you install a seamless aluminum gutter or construct your gutter using a plastic pipe that meets the requirements of ANSI/NSF Standard 14 or Standard 61. We do not know of any aluminum gutter that has been certified under either NSF Protocol P151 or ANSI/NSF Standard 61. However, aluminum is a relatively inert material that oxidizes very slowly. Seamless aluminum, therefore, should be relatively safe to use and allows you to avoid joint seams, which can harbor bacteria and algal growths. PVC pipe that meets ANSI/NSF requirements is readily available and will bear an ANSI/NSF label along the length of the pipe. However, PVC gutters will probably not last as long as seamless aluminum gutters, because plastics are more vulnerable to sunlight damage and decay than aluminum.”

The above reference document, “Harvesting, Storing, and Treating Rainwater for Domestic Indoor Use,” may be accessed via the link below:

NSF Product and Service Listings may be accessed via the link below:

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as it may be incomplete regarding the materials used in rainwater catchment drainage systems. The Technical Committee recommends that additional updates be made, and a public comment be submitted. Additionally, there is concern that NSF/ANSI/CAN 61 does not provide applicable testing requirements.
Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: A 103.2  Item #: 118
SUBMITTER: Laura Allen  Grewater Action  Comment #: 1

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

A 103.0 Potable Rainfall Catchment System Materials.

A 103.2 Rainwater Catchment System Drainage Materials. Gutters and downspouts used in rainwater catchment drainage systems shall be made from nonleaching metal, or plastic pipe that meets the requirements of NSF/ANSI 14 and NSF/ANSI/CAN 61. All rainwater system components under the scope of NSF/ANSI/CAN 61 shall comply with it. Additional rainwater components under the scope of NSF P151 shall comply with it, comply with NSF Protocol P151, and leaders and conductors shall be listed to NSF 61.

Note: NSF/ANSI 14, NSF/ANSI/CAN 61, and NSF P151 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The scope of NSF P151 is as follows: "This testing protocol covers gutters, barrier materials, and/or catchment surfaces (coatings, paints, lining, and liners) placed on roof tops and ground surfaces that come in direct contact with rainwater that is collected and used as drinking water."

Additional information regarding NSF P151 may be viewed here: https://info.nsf.org/Certified/Protocols/Listings.asp?Standard=P151&

Currently, no gutters are listed to NSF P151 so at this point we should not require NSF P151 for gutters, otherwise that requirement will inadvertently prohibit potable rainwater systems. There are thousands of potable rainwater systems in operation in the US without issue. The goal is for rainwater to be of suitable quality when it enters the tank so that the further treatment required (filtering and disinfecting) will make it safe to drink.

Other parts of the country that permit potable rainwater systems have these requirements on gutters, which are in alignment with this proposal:
• San Juan County (Washington state): PVC or enameled metal.
• Hawaii: Gutters like roofs, gutters should be made of inert materials. Most commercially installed gutters in Hawaii are made of seamless aluminum. Also, a number of stores carry PVC or plastic gutters. Like roofs, the gutter materials should be as inert as possible. Copper, for example, is not a good choice for a gutter.

There are other components in a rainwater harvesting system besides leaders and conductors so the requirement should be more broad to bring in other potential components. NSF P151 lists coatings for roofs and does not include any pipes or other components of a rainwater catchment system that move water from the collection area to the tank so it should not be referenced here. (It is referenced in the section on roof materials.)

Sources:

[Supporting documentation is provided in KAVI for TC review]
Proposals

Item #: 119
WEStand 2023  Section: A 104.2.3, Table A 104.2.1, Table A 104.2.3

SUBMITTER: Laura Allen
Greywater Action

RECOMMENDATION:
Revise text

A 104.0 Design and Installation.

A 104.2 Minimum Water Quality. (remaining text unchanged)

A 104.2.3 Maintenance. Normal system maintenance shall require system testing for total coliform. If a total coliform test is positive, the system shall be tested for Escherichia coli (fecal coliform). Total coliform and turbidity shall be tested every 3 months in accordance with Table A 104.2.3. Upon failure of the fecal coliform test, systems shall be re-commissioned involving cleaning, and retesting in accordance with Section A 104.2.

<table>
<thead>
<tr>
<th>TABLE A 104.2.1</th>
<th>MINIMUM WATER QUALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coliform</td>
<td>Non-detectable</td>
</tr>
<tr>
<td>Escherichia coli (fecal coliform):</td>
<td>Non-detectable</td>
</tr>
<tr>
<td>Turbidity:</td>
<td>&lt;0.3 NTU</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE A 104.2.3</th>
<th>MINIMUM SYSTEM MAINTENANCE REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coliform</td>
<td>Non-detectable</td>
</tr>
<tr>
<td>Escherichia coli (fecal coliform):</td>
<td>Non-detectable</td>
</tr>
<tr>
<td>Turbidity:</td>
<td>&lt;0.3 NTU</td>
</tr>
</tbody>
</table>

SUBSTANTIATION:
During the last code cycle, Table A 101.5.1 (Minimum Potable Rainwater Catchment System Testing, Inspection and Maintenance Frequency) was updated to require testing for total coliform, which is a more general test when compared to the fecal coliform test, and would better show if the filtration and disinfection system was not operating. If the total coliform test was positive, then a follow-up fecal coliform test would be done. Fecal coliform is a better indicator for a potential pathogen to be found in the system, but is more specific than the total coliform test. So it should be used as a follow up test. Furthermore, starting with a total coliform test is consistent with EPA guidelines for monitoring drinking water.

Under the EPA's Drinking Water Requirements for States and Public Water Systems, the "Revised Total Coliform Rule and Total Coliform Rule" may be accessed via the link below:
https://www.epa.gov/dwreginfo/revised-total-coliform-rule-and-total-coliform-rule

COMMITTEE ACTION: ACCEPT AS SUBMITTED
TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS: AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: A 104.2.3, Table A 104.2.1, Table A 104.2.3  Item #: 119
SUBMITTER: Jazmin Curiel  Self
RECOMMENDATION:
Accept as Modified
Request to accept the code change proposal as modified by this public comment.

Request to accept the code change proposal as modified by this public comment.

TABLE A 104.2.1
MINIMUM WATER QUALITY

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>ACCEPTABLE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coliform</td>
<td>Non-detectable</td>
</tr>
<tr>
<td>Escherichia coli (fecal coliform)</td>
<td>Non-detectable</td>
</tr>
<tr>
<td>Heterotrophic Plate Count (HPC)</td>
<td>&lt;500 CFU/mL</td>
</tr>
<tr>
<td>Turbidity</td>
<td>&lt;0.3 NTU</td>
</tr>
</tbody>
</table>

A 104.2.3 Maintenance. Normal system maintenance shall require system testing for total coliform. If a total coliform test is positive, the system shall be tested for Escherichia coli (fecal coliform). Total coliform, Heterotrophic Plate Count (HPC), and turbidity shall be tested every 3 months in accordance with Table A 104.2.3. Upon failure of the fecal coliform test, systems shall be re-commissioned involving cleaning, and retesting in accordance with Section A 104.2.

TABLE A 104.2.3
MINIMUM SYSTEM MAINTENANCE REQUIREMENTS

<table>
<thead>
<tr>
<th>PARAMETER</th>
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<tbody>
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<tr>
<td>Heterotrophic Plate Count (HPC)</td>
<td>&lt;500 CFU/mL</td>
</tr>
<tr>
<td>Turbidity</td>
<td>&lt;0.3 NTU</td>
</tr>
</tbody>
</table>

(Shown for information purposes only)

A 104.2 Minimum Water Quality. Upon initial system startup, the quality of the water for the intended applications shall be verified at the point(s) of use, as determined by the Authority Having Jurisdiction in accordance with Section A 104.2.1 and Section A 104.2.2. Water quality maintenance shall be according to Section A 104.2.3.

A 104.2.1 Private Potable Water System. In the absence of water quality requirements determined by the Authority Having Jurisdiction, the minimum water quality for a private potable water system at the point of use shall comply with Table A 104.2.1.

SUBSTANTIATION:
Table A 104.2.1 (Minimum Water Quality), Section A 104.2.3 (Maintenance), and Table A 104.2.3 (Minimum System Maintenance Requirements) are being updated to include a new parameter, Heterotrophic Plate Count (HPC). HPC measures colony formation on culture media of heterotrophic bacteria in drinking water, and testing for HPC is a great overall indicator of bacteriological quality of the drinking water. This value is also consistent with ARCSA/ASPE 63 and the U.S. EPA and poses no conflict if inserted into the proposed locations.
Proposals

Item #: 121
WEStand 2023  Section: A 104.3.2

SUBMITTER: Billy Smith
Chair, WE-Stand Technical Committee

RECOMMENDATION:
Revise text

A 104.0 Design and Installation.

A 104.3 Water Quality Devices and Equipment. (remaining text unchanged)

A 104.3.2 Disinfection Devices. Chlorination, ozone, and ultraviolet, or other disinfection methods shall be approved by the Authority Having Jurisdiction, or where the product shall be listed and certified according to a microbiological reduction performance standard for drinking water, shall be used to treat harvested rainwater to meet the required water quality permitted. The disinfection devices and systems shall be installed in accordance with the manufacturer’s installation instructions and the conditions of listing. Disinfection devices and systems shall be located downstream of the water storage tank.

SUBSTANTIATION:
The revisions to the above section provide necessary improvements for clarity and enforceability. The proposed modifications are also consistent with the plumbing code.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS:  AFFIRMATIVE: 17  NEGATIVE: 11  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Note: Item # 121 failed to achieve the necessary two-thirds affirmative vote of returned ballots. In accordance with Section 6.8.2 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard, a public comment is requested for this proposal. The Technical Committee will reconsider this proposal as a public comment.

EXPLANATION OF NEGATIVE:

BRABAND: Confusing language.

CUDAHY: This doesn’t add clarity.

KLEIN: The proposed language is more confusing than the existing language.

KOELLER: Agree with the comments by Mr. Edward Osann and Mr. Pat Lando.

LANDO: The proposed language is more confusing than the existing language.

LENGER: Confusing language not achieving clarification.

OSANN: This proposal leaves the amended paragraph with garbled syntax. The substantiation claims the changes improve clarity and enforceability, but the effect is the opposite. This proposal needs to be corrected in public comment.
PAPE: Agree with all prior comments.

PREMER: This language is confusing.

SOVOCOOL: I agree. It no longer reads properly.

THOMPSON: I agree with the comments submitted by others. The existing text is clearer than the proposed revision.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: 217.0, 604.11.2, A 104.3.2  Item #: 121
SUBMITTER: Chelsea Salaiz  Self

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

604.0 On-Site Treated Nonpotable Water Systems.

604.11 Design and Installation. (remaining text unchanged)

604.11.2 Minimum Water Quality. On-site treated nonpotable water supplied to toilets or urinals or for other uses in which it is sprayed or exposed shall be disinfected. Acceptable disinfection methods shall include chlorination, ultraviolet sterilization, ozonation, or other methods as approved by the Authority Having Jurisdiction. The minimum water quality for on-site treated nonpotable water systems shall meet the applicable water quality requirements for the intended applications as determined by the Authority Having Jurisdiction. Potable water shall be supplied to personal hygiene devices (bidet and bidet seats).

A 104.0 Design and Installation.

A 104.3 Water Quality Devices and Equipment. (remaining text unchanged)

A 104.3.2 Disinfection Devices. Chlorination, ozonation, and ultraviolet sterilization, or other disinfection methods shall be approved by the Authority Having Jurisdiction, or the product shall be listed according to a microbiological reduction performance standard for drinking water used to treat harvested rainwater to meet the required water quality permitted. The disinfection devices and systems shall be installed in accordance with the manufacturer’s installation instructions and the conditions of listing. Disinfection devices and systems shall be located downstream of the water storage tank.

217.0 - O -

Ozonation. The process of treating water with ozone, often as part of a purification process. Ozone (Activated Oxygen, O₃). A gaseous disinfectant-oxidant (generated on-site) which produces a broad spectrum biocide used to kill bacteria, viruses, and cysts in wastewater treatment.

SUBSTANTIATION:
Ozonation is listed as one of the approved disinfection methods and should be supported by appropriate terminology within Chapter 2 (Definitions). Many wastewater treatment systems utilize this method of disinfection, and the process is not widely understood. This provided definition, in conjunction with the definition for “ozone,” clarifies that ozone is a gaseous disinfectant-oxidant used in the treatment process called “ozonation.” Revisions to Section 604.11.2 (Minimum Water Quality) and Section A 104.3.2 (Disinfection Devices) are needed to correctly reference this treatment process.
APPENDIX C
PEAK WATER DEMAND CALCULATOR - EXAMPLES
(This Appendix is based on the technical paper entitled “Peak Water Demand Study.”
A copy of the paper is available for download at: www.iapmo.org/WEStand/Pages/default.aspx)

C 101.0 General.
C 101.1 Applicability. This appendix provides examples illustrating the use of the Water Demand Calculator to estimate the supply demand load for the building water supply and principal branches and risers for single- and multi-family dwellings. See Chart C 101.1(1) through Chart C 101.1(9) for determining pipe size based on friction loss and maximum allowable pipe velocity.

C 102.0 Examples Illustrating Use of Water Demand Calculator with Appendix A.
C 102.1 Example 1: Indoor Water Use Only. Use the information given below to find the pipe size for the building supply to a residential building with six indoor fixtures as shown in Figure 1.C.102.1(1) [Pipe Section 4].

Given Information:
- Type of construction: Residential, one-bathroom
- Type of pipe material: L-copper
- Fixture number/type: 1 combination bath/shower, 1 kitchen faucet, 1 lavatory faucet, 1 dishwasher, 1 WC, 1 clothes washer

Friction loss per 100 ft (30 m): 15 psi (103 kPa)
Maximum velocity: 10.8 ft/s (2.4 m/s)
Solution: Step 1 of 2 – Find Demand Load for the Building Supply

The Water Demand Calculator [WDC] in Figure 2-C 102.1(2) is used to determine the demand load expected from indoor water use. The WDC has white-shaded cells and gray-shaded cells. The values in the gray cells are derived from a national survey of indoor water use at homes with efficient fixtures and cannot be changed. The white-shaded cells accept input from the designer. For instance, fixture counts from the given information are entered in the Column [B] designated as total number of fixtures; the corresponding recommended fixture flow rates are already provided in the flow rate Column [D]. The flow rates in Column [D] the white cells may be reduced only if the manufacturer specifies a lower flow rate for the fixture. The last Column [E] showing maximum fixture flow rates establishes the upper limits for the flow rates entered into the fixture flow rate Column [D]. Clicking the “Run Water Demand Calculator [WDC]” button gives 8.59 gpm (0.57 L/s) as the estimated indoor water demand for the whole building. This result appears in the dark gray output box on the right-hand side of the WDC in Figure 2-C 102.1(2).

![Water Demand Calculator](image)

FIGURE 2-C 102.1(2)
WATER DEMAND CALCULATOR FOR INDOOR USE AT HOME WITH SIX EFFICIENT FIXTURES (EXAMPLE 1).

Solution: Step 2 of 2 – Determine the Pipe Size of the Building Supply

Chart A 105.1(1) for copper piping systems (from Appendix A of the UPC, shown in Figure 3) Figure C 102.1(3) is used to determine the pipe size, based on given friction loss, given maximum allowable pipe velocity, given pipe material and the demand load computed in Step 1. In Figure 3-C 102.1(3), the intersection of the given friction loss (15 psi) (103 kPa) and the maximum allowable pipe velocity (108 ft/s) (2.4 m/s) is labeled point A. The vertical line that descends from point A to the base of the chart, intersects four nominal sizes for L-copper pipe. These intersection points are labeled B, C, D, E and correspond to pipe sizes of 1 inch (25 mm), ¾ inch (20 mm), ½ inch (15 mm) and 3/8 inch (10 mm), respectively. A horizontal line from points B, C, D, E to the right-hand side of the chart gives maximum flow rates of 2420 gpm (1.3 L/s), 12 gpm (0.75 L/s), 4.5 gpm (0.28 L/s), and 2.3 gpm (0.15 L/s), respectively. These results are summarized in Table 1-C 102.1 which shows that a ¾-inch (20 mm) L-copper line is the minimum size that can convey the peak water demand of 8.59 gpm (0.57 L/s).
TABLE 3-C 102.1
PIPE SIZE OPTIONS FOR BUILDING SUPPLY

<table>
<thead>
<tr>
<th>POINT IN FIGURE 3 C 102.1(3)</th>
<th>PIPE DIAMETER (inch)</th>
<th>MAXIMUM FLOW (gpm)</th>
<th>OK FOR BUILDING SUPPLY¹*</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>3/8</td>
<td>2.3</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>1/2</td>
<td>4.5</td>
<td>No</td>
</tr>
<tr>
<td>C</td>
<td>3/4</td>
<td>12</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>2420</td>
<td>Yes</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s

¹* For Building in Examples 1, 2, 3, and 4.

For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
**C 102.2 Example 2: Indoor and Outdoor Water Use**—Find the pipe size for the building supply [Figure 4C.102.1(1), Pipe Section 4] if the building in Example 1 adds two outdoor fixtures (hose bibbs, each with a fixture flow of 2.0 gpm (0.13 L/s)).

**Solution: Step 1 of 2 – Find Demand Load for the Building Supply**

The WDC has been developed exclusively for peak indoor water use which can be viewed as a high frequency short duration process. Because fixtures for outdoor water use may operate continuously for very long periods, they are not included in the WDC. To account for water use from one or more outdoor fixtures, add the demand of the single outdoor fixture with the highest flowrate to the calculated demand for indoor water use. With two hose bibbs, the demand of only one hose bibb is included. Hence, in this example, the total demand for the whole house is $8.0 + 2.0 = 10.0$ gpm (0.70 L/s).

**Solution: Step 2 of 2 – Determine the Pipe Size of the Building Supply**

Table 4C.102.1 shows that at 10.0 gpm (0.70 L/s) the building supply shall be ¾-inch in diameter.

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**C 102.3 Example 3: Indoor, Outdoor and Other Fixture Water Use**—Find the pipe size for the water supply [Figure 4C.102.1(1), Pipe Section 4] if the building in Example 2 adds a kitchen pot filler and a dog bath each with a faucet flow rate of 5.5 gpm (0.35 L/s).

**Solution: Step 1 of 2 – Find Demand Load for the Building Supply**

The kitchen pot filler and dog bath are not listed in the fixture list of the WDC. To accommodate cases such as this, the WDC provides up to three additional rows for “Other Fixtures.” Enter the kitchen pot filler and dog bath in the fixture list of the WDC and enter the fixture count for each in the next column. Find an indoor fixture that has a similar probability of use in the probability column and add that to the column. Finally, enter the flow rate of the kitchen pot filler and dog bath in the flow rate column. The estimated indoor water demand for the whole building is 11.0 gpm (0.70 L/s), as shown in the WDC in Figure 4C.102.3. As illustrated in Example 2, the hose bibb will increase the total demand for the whole house to 13.0 gpm (0.82 L/s). Note that a reset button is provided to clear any numbers in Column [B] from a previous calculation.

**Solution: Step 2 of 2 – Determine the Pipe Size of the Building Supply**

Table 4C.102.1 shows that at 13.0 gpm (0.82 L/s) the building supply shall be 1-inch (25 mm) in diameter.
FIGURE 4-C 102.3
WATER DEMAND CALCULATOR TO ACCOMMODATE OTHER FIXTURES (EXAMPLE 3).

C 102.4 Example 4: Sizing Branches and Risers. For individual hot and cold branches, repeat Steps 1 and 2. For example, for the hot water branch at the water heater [Figure 4-C 102.1(1), Pipe Section 3], enter all the fixtures and appliances that use hot water into the Water Demand Calculator (toilets will be excluded) as seen in Figure 5-C 102.4. Use the calculated demand load to find the pipe size in Step 2. Table 4-C 102.1 shows that at 7.7-9.0 gpm (0.57 L/s), the hot water branch shall be ¾-inch (20 mm) in diameter.

For each additional hot and cold branch [Figure 4-C 102.1(1), Pipe Sections 1 and 2], enter the number of fixtures and appliances served by that branch into the WDC and use that demand in Step 2 to determine the branch size. If the branch serves a hose bibb, add the demand of the hose bibb to the calculated demand flow for the branch. As discussed in Example 2, the hose bibb is not to be entered into WDC, since the Calculator is for indoor uses only. When there is only one fixture or appliance served by a fixture branch, the demand flow shall not exceed the fixture flow rate in the last column [E] of the Water Demand Calculator. The fixture flow rate would be used in Step 2 to determine the size of the fixture branch and supply.
FIGURE 5-C 102.4
WATER DEMAND CALCULATOR FOR THE HOT WATER BRANCH (EXAMPLE 4).

C 102.5 Example 5: Multi-family Application. When using the WDC for multi-family dwellings, use the drop-down menu on the top left corner that allows you to select either single-family residence or a multi-family building. Choosing the multi-family option opens two more boxes to fill in information. (See Figure C 102.5.) When estimating for a multi-family building, enter the total number of dwelling units in the building. The example shows a total of 100 dwelling units in the building. The box below it will be for the number of units you are calculating for. If you are calculating for the whole building, enter the same number of 100. If you are calculating for half the dwelling units, enter 50. If you are estimating for only one unit, then enter the number one. The total number of units in the first box will not change in any of your calculations. Then use the WDC, as has been explained earlier, for sizing branches and risers.

FIGURE C 102.5
WATER DEMAND CALCULATOR FOR MULTI-FAMILY DWELLINGS (EXAMPLE 5).
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
CHART C.101.1(8)
PRESSURE LOSS OF PEX TUBING AT 60°F

For SI units: °C = (°F-32)/1.8, 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
CHART C 101.1(9)
PRESSURE LOSS OF PEX TUBING AT 120°F

For SI units: °C = (°F-32)/1.8, 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
**SUBSTANTIATION:**
In support of the other recommendations generated by this Task Group, Appendix C has been revised to include updated examples for the Water Demand Calculator. As depicted within the applicability, the provided examples illustrate the use of the WDC to estimate the supply demand load for the building water supply and principal branches and risers for single- and multi-family dwellings.

To provide users of this appendix with figures that more closely resemble the WDC program, the previous tables used for data inputs were replaced with screen captures of the WDC software. This also allowed for the removal of references to specific columns throughout the text. Additionally, the values provided were revised for consistency with the updated examples as shown in the WDC program figures.

Previously, this appendix did not offer an example of a multi-family application, nor did it include the necessary charts for determining pipe size based on friction loss and maximum allowable pipe velocity. Appendix C can now be used without cross-reference to another standard or to the plumbing code.

Chart C 101.1(1) through Chart C 101.1(7) were gathered from Appendix A (Recommended Rules for Sizing the Water Supply System) of the UPC, and Chart C 101.1(8) and Chart C 101.1(9) were gathered from IAPMO IS 31 (Installation Standard for PEX Tubing Systems for Hot- and Cold-Water Distribution).

In summary, the updates made to Appendix C are necessary to provide users of the WE-Stand with the appropriate tools for correctly using the Water Demand Calculator.

Additional information on the Water Demand Calculator may be found via the following link:
https://www.iapmo.org/water-demand-calculator/

[Supporting documentation is provided in KAVI for TC review]

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**
Based on the actions taken on Item #074, Item #123 is also being rejected. Chart C101.1(1) through Chart C101.1(9) from this proposal should be relocated to Chapter 5. This relocation would prevent conflict where Appendix C is not adopted by the jurisdiction and ensure applicable tools are provided for utilizing the WDC. The Technical Committee has identified this as the only reason for rejection and requests this change be made via public comment.

**TOTAL ELIGIBLE TO VOTE:** 30

**VOTING RESULTS:** AFFIRMATIVE: 24 NEGATIVE: 4 NOT RETURNED: 2 CRAWFORD, WILLIAMS

**EXPLANATION OF NEGATIVE:**

**KLEIN:** This needs to be cleaned up during public comment.

**KOELLER:** Rejection of this entire proposal because of one minor item of figure placement ("has identified this as the only reason for rejection") is unwarranted, when recommended modifications could have readily been made by the Technical Committee when originally considered.

**LANDO:** I agree with John Koeller. This needs to be cleaned up during public comment.

**PAPE:** Agree with John Koeller.
APPENDIX C

PUBLIC COMMENT 1
Code Year: 2023 WEStand  Section #: Appendix C Item #: 123
SUBMITTER: Jim Kendzel  Chair, WE-Stand Premise Water Supply System Design Task Group
RECOMMENDATION: Accept as Modified

Request to replace the code change proposal by this public comment.

APPENDIX C

PEAK WATER DEMAND CALCULATOR - EXAMPLES
(This Appendix is based on the technical paper entitled “Peak Water Demand Study.”
A copy of the paper is available for download at: www.iapmo.org/WEStand/Pages/default.aspx)

C 101.0 General.
C 101.1 Applicability. This appendix provides examples illustrating the use of the Water Demand Calculator to estimate
the supply demand load for the building water supply and principal branches and risers for single- and multi-family
dwellings. See Chart 503.3(1) through Chart 503.3(9) for determining pipe size based on friction loss and maximum
allowable pipe velocity.

C 102.0 Examples Illustrating Use of Water Demand Calculator with Appendix A.
C 102.1 Example 1: Indoor Water Use Only. Use the information given below to find the pipe size for the building supply to a residential building with six indoor fixtures as shown in Figure 4.C 102.1(1) [Pipe Section 4].

Given Information:
Type of construction: Residential, one-bathroom
Friction loss per 100 ft (30 480 mm): 15 psi (103.4 kPa)
Type of pipe material: L-copper
Maximum velocity: 10 8 ft/s (2.4 m/s)
Fixture number/type: 1 combination bath/shower
1 kitchen faucet
1 lavatory faucet
1 dishwasher
1 WC
1 clothes washer

Solution: Step 1 of 2 – Find Demand Load for the Building Supply
The Water Demand Calculator [WDC] in Figure 2-C 102.1(2) is used to determine the demand load expected from
indoor water use. The WDC has white-shaded cells and gray-shaded cells. The values in the gray cells are derived
from a national survey of indoor water use at homes with efficient fixtures and cannot be changed.
The white-shaded cells accept input from the designer. For instance, fixture counts from the given information are
entered in the cColumn [B] designated as total number of fixtures; the corresponding recommended fixture flow rates
are already provided in the flow rate cColumn [D]. The flow rates in Column [D] the white cells may be reduced only if
the manufacturer specifies a lower flow rate for the fixture. The last cColumn [E] showing maximum fixture flow rates
establishes the upper limits for the flow rates entered into the fixture flow rate cColumn [D]. Clicking the “Run Water
Demand Calculator WDC” button gives 8.590 gpm (0.57 L/s) as the estimated indoor water demand for the whole
building. This result appears in the dark gray output box on the right-hand side of the WDC in Figure 2-C 102.1(2).
Solution: Step 2 of 2 – Determine the Pipe Size of the Building Supply

Chart A 105.1(1) for copper piping systems (from Appendix A of the UPC, shown in Figure 3) Figure C 102.1(3) is used to determine the pipe size, based on given friction loss, given maximum allowable pipe velocity, given pipe material and the demand load computed in Step 1. In Figure 3-C 102.1(3), the intersection of the given friction loss (15 psi) (103.4 kPa) and the maximum allowable pipe velocity (408 ft/s) (2.4 m/s) is labeled point A. The vertical line that descends from point A to the base of the chart, intersects four nominal sizes for L-copper pipe. These intersection points are labeled B, C, D, E and correspond to pipe sizes of 1 inch (25 mm), ¾ inch (20 mm), ½ inch (15 mm) and 3/8 inch (10 mm), respectively. A horizontal line from points B, C, D, E to the right-hand side of the chart gives maximum flow rates of 2420 gpm (1.3 L/s), 12 gpm (0.06 L/s), 4.5 gpm (0.28 L/s), and 2.3 gpm (0.15 L/s), respectively. These results are summarized in Table 4-C 102.1 which shows that a ¾-inch (20 mm) L-copper line is the minimum size that can convey the peak water demand of 8.590 gpm (0.57 L/s).

**TABLE 4 C 102.1**

<table>
<thead>
<tr>
<th>POINT IN FIGURE 3 C 102.1(3)</th>
<th>PIPE DIAMETER (inch)</th>
<th>MAXIMUM FLOW (gpm)</th>
<th>OK FOR BUILDING SUPPLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>3/8</td>
<td>2.3</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>1/2</td>
<td>4.5</td>
<td>No</td>
</tr>
<tr>
<td>C</td>
<td>3/4</td>
<td>12</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>2420</td>
<td>Yes</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s

4 For Building in Examples 1, 2, 3, and 4.
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s

C 102.2 Example 2: Indoor and Outdoor Water Use. – Find the pipe size for the building supply [Figure 4C.102.1(1), Pipe Section 4] if the building in Example 1 adds two outdoor fixtures [(hose bibbs, each with a fixture flow of 2.0 gpm (0.13 L/s)].

Solution: Step 1 of 2 – Find Demand Load for the Building Supply
The WDC has been developed exclusively for peak indoor water use which can be viewed as a high frequency short duration process. Because fixtures for outdoor water use may operate continuously for very long periods, they are not included in the WDC. To account for water use from one or more outdoor fixtures, add the demand of the single outdoor fixture with the highest flowrate to the calculated demand for indoor water use. With two hose bibbs, the demand of only one hose bibb is included. Hence, in this example, the total demand for the whole house is 8.5 9.0 gpm (0.57 L/s) + 2.0 gpm (0.13 L/s) = 49.5 11.0 gpm (0.70 L/s).

Solution: Step 2 of 2 – Determine the Pipe Size of the Building Supply
Table 4C.102.1 shows that at 49.5 11.0 gpm (0.70 L/s) the building supply shall be ¾-inch (20 mm) in diameter.
C 102.3 Example 3: Indoor, Outdoor and Other Fixture Water Use. – Find the pipe size for the water supply [Figure 4C 102.1(1), Pipe Section 4] if the building in Example 2 adds a kitchen pot filler and a dog bath each with a faucet flow rate of 5.5 gpm (0.35 L/s).

Solution: Step 1 of 2 – Find Demand Load for the Building Supply
The kitchen pot filler and dog bath are not listed in the fixture list column [A] of the WDC. To accommodate cases such as this, the WDC provides up to three additional rows for “Other Fixtures.” Enter the kitchen pot filler and dog bath in the fixture list column [A] of the WDC and enter the fixture count for each in the next column [B]. Find an indoor fixture that has a similar probability of use in the probability column [C] and add that to the column. Finally, enter the flow rate of the kitchen pot filler and dog bath in the flow rate column [D]. The estimated indoor water demand for the whole building is 11.0 gpm (0.70 L/s), as shown in the WDC in Figure 4C 102.3. As illustrated in Example 2, the hose bibb will increase the total demand for the whole house to 13.0 gpm (0.83 L/s). Note that a reset button is provided to clear any numbers in Column [B] from a previous calculation.

Solution: Step 2 of 2 – Determine the Pipe Size of the Building Supply
Table 4C 102.1 shows that at 13.0 gpm (0.83 L/s) the building supply shall be 1-inch (25 mm) in diameter.
**C 102.4 Example 4: Sizing Branches and Risers.** For individual hot and cold branches, repeat Steps 1 and 2. For example, for the hot water branch at the water heater [Figure 4C 102.1(1), Pipe Section 3], enter all the fixtures and appliances that use hot water into the Water Demand Calculator (toilets will be excluded) as seen in Figure 5-C 102.4. Use the calculated demand load to find the pipe size in Step 2. Table 4C 102.1 shows that at 7-79.0 gpm (0.57 L/s), the hot water branch shall be ¾-inch (20 mm) in diameter.

For each additional hot and cold branch [Figure 4C 102.1(1), Pipe Sections 1 and 2], enter the number of fixtures and appliances served by that branch into the WDC and use that demand in Step 2 to determine the branch size. If the branch serves a hose bibb, add the demand of the hose bibb to the calculated demand flow for the branch. As discussed in Example 2, the hose bibb is not to be entered into WDC, since the Calculator is for indoor uses only. When there is only one fixture or appliance served by a fixture branch, the demand flow shall not exceed the fixture flow rate in the last column (F) of the Water Demand Calculator. The fixture flow rate would be used in Step 2 to determine the size of the fixture branch and supply.

**FIGURE 5-C 102.4**
WATER DEMAND CALCULATOR FOR THE HOT WATER BRANCH (EXAMPLE 4).

**C 102.5 Example 5: Multi-family Application.** When using the WDC for multi-family dwellings, use the drop-down menu on the top left corner that allows you to select either single-family residence or a multi-family building. Choosing the multi-family option opens two more boxes to fill in information. (See Figure C 102.5.) When estimating for a multi-family building, enter the total number of dwelling units in the building. The example shows a total of 100 dwelling units in the building. The box below it will be for the number of units you are calculating for. If you are estimating for the whole building, enter the same number of 100. If you are calculating for half the dwelling units, enter 50. If you are estimating for only one unit, then enter the number one. The total number of units in the first box will not change in any of your calculations. Then use the WDC, as has been explained earlier, for sizing branches and risers.
In response to the committee statement provided for rejecting Item #074 and Item #123, the Premise Water Supply System Design Task Group has generated public comments to address concerns expressed. The charts, used for determining diameters of building supply pipe, branches, and risers, have been relocated to Chapter 5 as shown in the public comment submitted by this Task Group for Item #074. This relocation offers applicable tools and provides additional guidance when implementing the Water Demand Calculator (WDC). The charts have been removed from Appendix C (Peak Water Demand Calculator - Examples), and references to these charts have been updated accordingly.

The Technical Committee identified this as the only reason for rejection. Therefore, this public comment, in conjunction with the public comment submitted for Item #074, should resolve the concerns expressed during the last Technical Committee meeting.
APPENDIX E
ONSITE WASTEWATER TREATMENT FOR DIRECT POTABLE WATER REUSE

E 101.0 General.
E 101.1 Applicability. The provisions of this appendix shall apply to the design and installation of onsite wastewater treatment systems for direct potable water reuse in one- and two-unit residential buildings.
E 101.2 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any onsite wastewater treatment system within a building or on a premises without first obtaining a permit to do such work from the Authority Having Jurisdiction.
E 101.2.1 Plumbing Plan Submission. No permit for any onsite wastewater treatment system shall be issued until complete plumbing plans, with appropriate data satisfactory to the Authority Having Jurisdiction, have been submitted and approved.
E 101.2.2 System Changes. No changes or connections shall be made to the onsite wastewater treatment system without approval by the Authority Having Jurisdiction.
E 101.3 Component Identification. System components shall be properly identified as to the manufacturer.
E 101.4 Maintenance and Inspection. Mechanical and plumbing systems, materials, and appurtenances, both existing and new, of a premise under the Authority Having Jurisdiction, shall be maintained in operating conditions. Devices or safeguards required by this appendix shall be maintained in accordance with the standard edition under which installed. The owner or the owner’s designated agent shall be responsible for the maintenance of mechanical and plumbing systems. To determine compliance with this subsection, the Authority Having Jurisdiction shall be permitted to cause a system to be reinspected.
E 101.5 Material Compatibility. Onsite wastewater 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.
E 101.6 Minimum Water Quality Requirements. The minimum output water quality of an onsite wastewater treatment system shall meet the potable water quality requirements of the adopted direct potable water reuse standards, or in absence, shall comply with the water quality requirements specified by the Authority Having Jurisdiction.

SUBSTANTIATION:
The proposed Appendix E addresses design and installation of onsite wastewater treatment systems for direct potable water reuse in one- and two-unit residential buildings. Currently the WE•Stand does not address these types of onsite treatment systems, and such inclusion would be beneficial. There is an increasing demand for water treatment and reuse systems in residential applications, and the proposed language offers an innovative approach which is effective at reducing water consumption.

As there are varying potable water requirements per local jurisdiction, the minimum required water quality for the output of these treatment systems is required to comply with the AHJ. Basic provisions for maintenance and inspection have also been included to ensure systems are maintained in safe operating conditions.
COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC

APPENDIX E
ONSITE WASTEWATER TREATMENT FOR DIRECT POTABLE WATER REUSE

E 101.0 General.
E 101.1 Applicability. The provisions of this appendix shall apply to the design and installation of onsite wastewater treatment systems for direct potable water reuse in one- and two-unit residential buildings.

E 101.2 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any onsite wastewater treatment system within a building or on a premises without first obtaining a permit to do such work from the Authority Having Jurisdiction.

E 101.2.1 Plumbing Plan Submission. No permit for any onsite wastewater treatment system shall be issued until complete plumbing plans, with appropriate data satisfactory to the Authority Having Jurisdiction, have been submitted and approved.

E 101.2.2 System Changes. No changes or connections shall be made to the onsite wastewater treatment system without approval by the Authority Having Jurisdiction.

E 101.3 Component Identification. System components shall be properly identified as to the manufacturer.

E 101.4 Maintenance and Inspection. Mechanical and plumbing systems, materials, and appurtenances, both existing and new, of a premise under the Authority Having Jurisdiction, shall be maintained in operating conditions. Devices or safeguards required by this appendix shall be maintained in accordance with the standard edition under which installed. The owner or the owner’s designated agent shall be responsible for the maintenance of mechanical and plumbing systems. To determine compliance with this subsection, the Authority Having Jurisdiction shall be permitted to cause a system to be reinspected.

E 101.5 Material Compatibility. Onsite wastewater 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.

E 101.6 Minimum Water Quality Requirements. The minimum output water quality of an onsite wastewater treatment system shall meet the potable water quality requirements of the adopted direct potable water reuse standards, or in absence, shall comply with the water quality requirements specified by the Authority Having Jurisdiction.

COMMITTEE STATEMENT:
The modification updates the applicability of the newly proposed Appendix E from one-and two-unit “residential buildings” to one-and two-unit “family dwellings and townhouses.” This revision is necessary as there are varying interpretations of what is considered a one- or two-unit residential building.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 21 NEGATIVE: 5 ABSTAIN: 2 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:
LENGER: As the proponent and author, I agree with the poor choice of “family.” It was referring to the low microbiological risk within a household. I will address the issue in public comments. As to the need for more input, I disagree. Science does not work on consensus. The proposed appendix lays out all commonly known treatment technologies and all industry-standard stages. This is already being done, and the AHJ can approve a system, regardless of this appendix, if it chooses to do so. It also could be an engineered system.

EXPLANATION OF NEGATIVE:
CUDAHY: I concur with Jim Kendzel.

KENDZEL: It is understood that Appendices to WE•Stand can be considered for adoption at the local level. This proposal is not ready to be published as an Appendix written on code language. The consideration of adopting the onsite treatment of wastewater for direct potable water use requires a significant more amount of work and involvement of the appropriate government agencies to ensure all public health aspects have been fully considered before any appendix of this nature is published.

KOELLER: I do not agree that substitution of the word "family" for the word "residential" is appropriate. We all KNOW what a residential dwelling is, but it appears that we will now be required to actually define the word "family!" Furthermore, the committee’s statement that there are "varying interpretations of what is considered a one- or two-unit residential building" is not explained. What "interpretations" are being referred to? Will the change to "family" INCREASE the number of "misinterpretations?"
PAPE: Agree with John Koeller’s statement.

WHITE: I do not support these proposals related to direct potable water reuse and believe more clarification is needed.

EXPLANATION OF ABSTAIN:

BARNES: I concur with the American Supply Association (Jim Kendzel) and Koeller and Company's (John Koeller) comments. More discussion on this topic is needed.

MCLEOD: I concur with Jim Kendzel.

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APPENDED COMMENTS

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: Table 1201.1, E 101.1, E 101.6, E 102.0  Item #: 124

SUBMITTER: Markus Lenger  Chair, WE-Stand Direct Potable Water Use Task Group  Comment #: 1

RECOMMENDATION: Accept as Modified

Request to accept the code change proposal as modified by this public comment.

APPENDIX E
ON SITE WASTEWATER TREATMENT FOR DIRECT POTABLE WATER REUSE

E 101.0 General.

E 101.1 Applicability. The provisions of this appendix shall apply to the design and installation of onsite wastewater treatment systems for direct potable water reuse in one- and two-unit family dwellings and townhouses dwelling units.

E 101.6 Minimum Water Quality Requirements. The minimum output water quality at the point of use (POU) of an onsite wastewater treatment system shall comply with Table A 104.2.3, ARCSA/ASPE/ANSI 63, and meet the potable water quality requirements specified by the Authority Having Jurisdiction, or in absence, shall meet the potable water requirements of the adopted direct potable water reuse standards, or in absence, shall comply with the water quality requirements specified by the Authority Having Jurisdiction.

E 102.0 Definitions. Dwelling Unit. A single residential unit which provides independent water utility for one or more persons of the same family or household.

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TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCSA/ASPE/ANSI 63-2013</td>
<td>Rainwater Catchment Systems</td>
<td>902.1, A104.9.1, E101.6</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: ARCSA/ASPE/ANSI 63 meets the requirements for a mandatory referenced standard in accordance with Section 15.9 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.
### TABLE A 104.2.3
**MINIMUM SYSTEM MAINTENANCE REQUIREMENTS**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Requirement Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coliform</td>
<td>Non-detectable</td>
</tr>
<tr>
<td>Escherichia coli (fecal coliform)</td>
<td>Non-detectable</td>
</tr>
<tr>
<td>Turbidity</td>
<td>&lt;0.3 NTU</td>
</tr>
</tbody>
</table>

**SUBSTANTIATION:**
Section E 101.1 (Applicability) is being updated to clarify that direct potable use systems covered by this appendix are to be used only for dwelling units, and the provided definition for “dwelling unit” clearly addresses the potential issues associated with multiple households utilizing a single direct potable use system. The applicability solely pertains to direct potable use systems utilized by the same family or household within a single residential unit that has independent water utility.

Section E 101.6 (Minimum Water Quality Requirements) is being revised to clarify that the water quality at the point of use (POU) must meet acceptable parameters for potable water applications. Reference has been made to ARCSA/ASPE/ANSI 63 (Rainwater Catchment Systems) as this standard establishes the minimum potable water quality parameters required at POU for harvested rainwater. These parameters are consistent with the potable water standards established by the U.S. EPA for drinking water. Since Table A 104.2.3 (Minimum System Maintenance Requirements) aligns with these values, reference to this table has also been included.

It should be noted that this section requires compliance with Table A 104.2.3, ARCSA/ASPE 63, and the potable water quality requirements specified by the Authority Having Jurisdiction. The use of Table A 104.2.3 and ARCSA/ASPE 63 are not intended to supersede the potable water quality requirements specified by the Authority Having Jurisdiction. All three are complimentary of one another. In any case, the most stringent potable water quality requirements will apply to these system outputs at the POU.

As established in Section 102.1 (Conflicts), previously Section 101.7 in the 2020 WEStand:
“Where, in any specific case, different sections of this standard or referenced standards specify different materials, methods of construction, or other requirements, the most restrictive shall govern as determined by the Authority Having Jurisdiction. When there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable.”
Proposals

Item #: 125
WEStand 2023  Section: E 102.0 - E 102.1

SUBMITTER: Markus Lenger
Chair, WE-Stand Direct Potable Water Reuse Task Group

RECOMMENDATION:
Add new text

E 102.0 Definitions.
E 102.1 General. For purposes of this appendix, the following definitions shall apply:

**Biological Oxygen Demand (BOD).** The amount of dissolved oxygen required by organisms to break down organic matter under aerobic conditions at a specific temperature. This value, measured in parts per million (ppm) (mg/L), is used as an indicator of wastewater treatment effectiveness.

**Biological Treatment.** Water treatment by means of aerobic or anerobic bioremediation using microbes or fungi.

**Chemical Disinfection.** Sterilization using a chemical reaction or oxidation to either kill or inhibit the RNA to DNA transcription, rendering pathogens harmless.

**Chlorination.** Sterilization using chlorine to either kill or inhibit the RNA to DNA transcription, rendering pathogens harmless.

**Coagulation.** A process which introduces small, highly charged molecules into water to destabilize the charges on particles, colloids, or oily materials in suspension increasing solid removal efficiency.

**Direct Potable Water Reuse (DPR).** Multiple phases of advanced water purification to transform treated wastewater into a safe, reliable drinking water supply.

**Flocculation.** A process in which clays, polymers or other small charged particles become attached and form a fragile structure, a floc.

**Heat Sterilization.** An act of destroying all forms of life on and in bacteriological media, foods, hospital supplies, and other materials by means of moist or dry heat.

**Membrane Filtration.** A physical process to separate substances via membranes which serve as thin layers of semi-permeable material that separate substances when a driving force is applied across the membrane.

**Ozonation.** The process of treating with ozone, often as part of a purification process.

**Potable Water.** Water that is satisfactory for drinking, culinary, and domestic purposes and that meets the requirements of the health Authority Having Jurisdiction.

SUBSTANTIATION:
The proposed definitions provide clarity and support the recommendations of this appendix. All treatment types are appropriately defined along with other terms which may not be common knowledge to users of the WE-Stand. For consistency, the definition for "potable water" correlates with the language provided in Chapter 2 (Definitions). Furthermore, these definitions offer users of the appendix with the necessary information to understand the listed system requirements and treatment types.
E 102.0 Definitions.
E 102.1 General. For purposes of this appendix, the following definitions shall apply:

**Biological-Biochemical Oxygen Demand (BOD).** The amount of dissolved oxygen required by organisms to break down organic matter under aerobic conditions at a specific temperature. This value, measured in parts per million (ppm) (mg/L), is used as an indicator of wastewater treatment effectiveness.

**Biological Treatment.** Water treatment by means of aerobic or anerobic bioremediation using microbes or fungi.

**Chemical Disinfection.** Sterilization using a chemical reaction or oxidation to either kill or inhibit the RNA to DNA transcription, rendering pathogens harmless.

**Chlorination.** Sterilization using chlorine to either kill or inhibit the RNA to DNA transcription, rendering pathogens harmless.

**Coagulation.** A process which introduces small, highly charged molecules into water to destabilize the charges on particles, colloids, or oily materials in suspension increasing solid removal efficiency.

**Direct Potable Water Reuse (DPR).** Multiple phases of advanced water purification to transform treated wastewater into a safe, reliable drinking water supply.

**Flocculation.** A process in which clays, polymers or other small charged particles become attached and form a fragile structure, a floc.

**Heat Sterilization.** An act of destroying all forms of life on and in bacteriological media, foods, hospital supplies, and other materials by means of moist or dry heat.

**Membrane Filtration.** A physical process to separate substances via membranes which serve as thin layers of semi-permeable material that separate substances when a driving force is applied across the membrane.

**Ozonation.** The process of treating with ozone, often as part of a purification process.

**Potable Water.** Water that is satisfactory for drinking, culinary, and domestic purposes and that meets the requirements of the health Authority Having Jurisdiction.

**COMMITTEE STATEMENT:**
The modification updates the term “biological” to “biochemical” for clarity regarding the definition for oxygen demand.

**TOTAL ELIGIBLE TO VOTE:** 30

**VOTING RESULTS:** Affirmative: 23  Negative: 3  Abstain: 2  Not Returned: 2  Crawford, Williams

**EXPLANATION OF NEGATIVE:**

**Kendzel:** It is understood that Appendices to WE•Stand can be considered for adoption at the local level. This proposal is not ready to be published as an Appendix written on code language. The consideration of adopting the onsite treatment of wastewater for direct potable water use requires a significant more amount of work and involvement of the appropriate government agencies to ensure all public health aspects have been fully considered before any appendix of this nature is published.

**Smith:** I agree as written here from Chuck White: “I do not support these proposals related to direct potable water reuse and believe more clarification is needed.”

**White:** I do not support these proposals related to direct potable water reuse and believe more clarification is needed.

**EXPLANATION OF ABSTAIN:**

**Barnes:** I am changing my vote to abstain which is consistent with my vote for Item #124. More discussion on this topic is needed.

**Mcleod:** More discussion is needed.
Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: E 102.1  Item #: 125
SUBMITTER: Markus Lenger
Chair, WE-Stand Direct Potable Water Use Task Group

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

E 102.0 Definitions.
E 102.1 General. For purposes of this appendix, the following definitions shall apply:

Aerobic Bioreactor. A device that uses oxygen to create a biologically active matrix for the purpose of breaking down organic matter.

Chemical Disinfection. Sterilization using a chemical reaction or oxidation to either kill or inhibit the RNA to DNA transcription, rendering pathogens harmless.

Chlorination. Sterilization A disinfection process using chlorine to either kill or inhibit the RNA to DNA transcription, rendering pathogens harmless.

Direct Potable Water Reuse (DPR). Multiple phases of advanced water purification to transform treated wastewater into a safe, reliable drinking water supply.

Heat Sterilization. An act of destroying all forms of life on and in bacteriological media, foods, hospital supplies, and other materials by means of moist or dry heat.

Nanofiltration. A water filtration process utilizing a thin-film membrane operating under low pressure to remove particles smaller than 10 nanometers (nm).

Polishing. A finishing treatment method used to maintain water quality levels after water leaves the treatment and processing stages.

Raw Water. Influent water collected from the dwelling unit and supplied to the direct potable water use treatment system. Also known as wastewater.

SUBSTANTIATION:
Terminology is being added for “aerobic bioreactor,” “nanofiltration,” “polishing,” and “raw water” to support the other revisions proposed by this Task Group.

Aerobic bioreactors are used in wastewater treatment systems to break down organic contaminants and other pollutants by means of oxygen diffusion. Oxygen serves as the terminal electron acceptor and is able to sustain a large number of important reactions that use a number of different electron donors. The provided definition offers a simplified description for aerobic reactor that is sufficient for the purposes of this appendix.

“Polishing” is now included in the new notes supporting Figure E 104.1 (Onsite Wastewater Treatment Stages for Direct Potable Use) and appropriate terminology for this term offers additional clarity when interpreting this informative language.

Furthermore, the term “sanitization” is more appropriate than “sterilization” for the purposes of this appendix and has been revised throughout for technical accuracy. The only appropriate use of the term sterilization is “UV sterilization” which has not been revised within this appendix. While sterilization removes all microorganisms, sanitization reduces microorganisms to a safe level. Following this intent, the definition of “chlorination” has been revised, and the definition of “heat sterilization” has been deleted. Figure E 104.1 has also been revised in Item #127 Public Comment 01 to reflect these updates.
Proposals

Item #: 126
WEStand 2023  Section: E 103.0 - E 103.7

SUBMITTER: Markus Lenger
Chair, WE-Stand Direct Potable Water Reuse Task Group

RECOMMENDATION:
Add new text

**E 103.0 System Requirements.**

**E 103.1 Connections to Potable Water Supply.** Onsite wastewater treatment systems shall have no direct connection to any potable water supply. Potable water shall be permitted to be used as makeup water for an onsite wastewater treatment system provided the potable water supply connection is protected by an airgap in accordance with the plumbing code.

**E 103.1.1 Cross-Contamination.** No person shall make a connection or allow one to exist between pipes or conduits carrying domestic water supplied by a public or private building supply system, and pipes, conduits, or fixtures containing or carrying water from any other source or containing or carrying water that has been used for any purpose whatsoever, or piping carrying chemicals, liquids, gases, or substances whatsoever, unless there is provided a backflow prevention device approved for the potential hazard and maintained in accordance with the plumbing code. Each point of use shall be separately protected where potential cross-contamination of individual units exists.

**E 103.1.2 Cross-Connection Inspection and Testing.** A cross-connection test is required in accordance with Section 601.11.2. 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.

**E 103.2 Overflow.** Raw water overflow shall be connected directly to the plumbing drainage system. The overflow piping 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.

**E 103.3 Treated Water.** Treated water shall be connected directly to an aerated storage tank capable of maintaining water quality in accordance with Section E 101.6. Storage capacity shall be determined based on the estimated daily volume of wastewater and usage of potable water.

**E 103.4 Diverter Valves.** The onsite wastewater treatment system shall connect to the sanitary drainage system through a diverter valve(s) approved by the Authority Having Jurisdiction. At a minimum, a diverter valve shall be installed between the main drain line and the onsite treatment system. Additional diverter valves shall be permitted to be installed at other locations as specified by the registered design professional and the Authority Having Jurisdiction.

**E 103.5 Isolation Valves.** A means of isolation shall be provided between the treatment system and the plumbing system. Automatic shutoff shall be provided in accordance with Section E 103.6.

**E 103.6 Monitoring and Controls.** Onsite wastewater treatment systems shall be provided with a means of continuous monitoring of the treatment stages and shall be provided with a means of automatic shutoff when a malfunction occurs or when measured parameters are outside of the acceptable ranges specified by the Authority Having Jurisdiction. In the event of a malfunction, raw water shall be diverted to the sewage system, and the diverter valve shall be reset only once safe operating conditions are met.

**Notes:**

1. Biological and pathogen parameters may only be measured by a qualified testing laboratory. Such testing requires multi-day turnaround for results. To control a system in real-time and react to water quality and flow fluctuations, reliable online measurement technology should be deployed.

2. The following types of sensors are available in the industry and provide reliable outputs:
   a. Flow rate
   b. Pressure
   c. Solid content
   d. ORP
(e) Temperature
(f) pH
(g) Dissolved oxygen
(h) Turbidity
(i) Total Suspended Solids
(j) Conductivity
(k) Gas

**E 103.7 Validation.** Where required by the Authority Having Jurisdiction, treatment processes shall be tested to verify the pathogen reduction performance. The treatment processes shall be validated through third-party component validation or field verification using challenge testing. The results of the third-party component validation and/or challenge testing 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.

**SUBSTANTIATION:**
Section E 103.0 (System Requirements) dictates the provisions for protecting the potable water supply along with cross-connection testing. In particular, Section E 103.1.1 (Cross-Contamination) was carried over from the plumbing code. Requirements have also been laid out to address raw water overflow and approved discharge to the plumbing drainage system. Furthermore, diverter valves at a minimum must be installed between the main drain line and the onsite treatment system. The installation of these valves is needed to connect the onsite wastewater treatment system to the sanitary drainage system. Additional diverter valves may also be installed per the AHJ or the registered design professional depending on the selected design.

Section E 103.5 (Isolation Valves) and Section E 103.6 (Monitoring and Controls) address water quality parameters, method of monitoring such parameters, and isolation of treatment stages/systems. All biological and pathogen parameters, as well as a host of other important water parameter readings, can only be measured in a qualified laboratory, and therefore, require a multi-day turnaround for test results. To control a system in real-time and react to water quality and flow fluctuations, reliable online measurement technology must be deployed. Sensors that are currently available and affordable producing reliable outputs are flow rate, solid content, ORP, temperature, pH, dissolved oxygen, turbidity, total suspended solids, conductivity, and a selection of gas sensors.

While critical water parameters such as Total Coliform, e-coli, and other pathogens as well as COD and BOD cannot be monitored online, it is still possible to assess system health via the sensors mentioned above. For example, ozone disinfection efficiency can be reliably measured using an ORP measurement. Filter removal efficiency can be measured via TDS, conductivity, or turbidity.

Therefore, a control system should be designed to monitor the system’s performance and initiate a system safety shut down if it detects unsafe treatment conditions or unacceptable output water quality. A remote request for service with relevant error codes and diagnostic information can be sent to the remote monitoring system. Automated safety shutdowns and lockouts ensure operational safety and should alleviate health concerns due to output water quality, system malfunction, or user tampering.

**COMMITTEE ACTION:** ACCEPT AS AMENDED BY THE TC

**E 103.0 System Requirements.**
**E 103.1 Connections to Potable Water Supply.** Onsite wastewater treatment systems shall have no direct connection to any potable water supply. Potable water shall be permitted to be used as makeup water for an onsite wastewater treatment system provided the potable water supply connection is protected by an airgap in accordance with the plumbing code.

**E 103.1.1 Cross-Contamination.** No person shall make a connection or allow one to exist between pipes or conduits carrying domestic water supplied by a public or private building supply system, and pipes, conduits, or fixtures containing or carrying water from any other source or containing or carrying water that has been used for any purpose whatsoever, or piping carrying chemicals, liquids, gases, or substances whatsoever, unless there is provided a backflow prevention device approved for the potential hazard and maintained in accordance with the plumbing code. Each point of use shall be separately protected where potential cross-contamination of individual units exists.

**E 103.1.2 Cross-Connection Inspection and Testing.** A cross-connection test is required in accordance with Section 601.11.2. 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.
E 103.2 Overflow. Raw water overflow shall be connected directly to the plumbing drainage system. The overflow piping 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.

E 103.3 Treated Water. Treated water shall be connected directly to an aerated storage tank capable of maintaining water quality in accordance with Section E 101.6. Storage capacity shall be determined based on the estimated daily volume of wastewater and usage of potable water.

E 103.4 Diverter Valves. The onsite wastewater treatment system shall connect to the sanitary drainage system through a diverter valve(s) approved by the Authority Having Jurisdiction. At a minimum, a diverter valve shall be installed between the main drain line and the onsite treatment system. Additional diverter valves shall be permitted to be installed at other locations as specified by the registered design professional and the Authority Having Jurisdiction.

E 103.5 Isolation Valves. A means of isolation shall be provided between the treatment system and the plumbing system. Automatic shutoff shall be provided in accordance with Section E 103.6.

E 103.6 Monitoring and Controls. Onsite wastewater treatment systems shall be provided with a means of continuous monitoring of the treatment stages and shall be provided with a means of automatic shutoff when a malfunction occurs or when measured parameters are outside of the acceptable ranges specified by the Authority Having Jurisdiction. In the event of a malfunction, raw water shall be diverted to the sewage system, and the diverter valve shall be reset only once safe operating conditions are met.

Notes:
(1) Biological and pathogen parameters may only be measured by a qualified testing laboratory. Such testing requires multi-day turnaround for results. To control a system in real-time and react to water quality and flow fluctuations, reliable online measurement technology should be deployed.
(2) The following types of sensors are available in the industry and provide reliable outputs:
(a) Flow rate
(b) Pressure
(c) Solid content
(d) Oxidation-reduction potential (ORP)
(e) Temperature
(f) pH
(g) Dissolved oxygen
(h) Turbidity
(i) Total Suspended Solids
(j) Conductivity
(k) Gas

E 103.7 Validation. Where required by the Authority Having Jurisdiction, treatment processes shall be tested to verify the pathogen reduction performance. The treatment processes shall be validated through third-party component validation or field verification using challenge testing. The results of the third-party component validation and/or challenge testing 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.

COMMITTEE STATEMENT:
The proposal is to be modified to expand the acronym for ORP, oxidation-reduction potential.

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 23 NEGATIVE: 4 NOT RETURNED: 3 CRAWFORD, MCLEOD, WILLIAMS

EXPLANATION OF NEGATIVE:

BARNES: I agree with the comment by the American Supply Association (Jim Kendzel).

KENDZEL: It is understood that Appendices to WE•Stand can be considered for adoption at the local level. This proposal is not ready to be published as an Appendix written on code language. The consideration of adopting the onsite treatment of wastewater for direct potable water use requires a significant more amount of work and involvement of the appropriate government agencies to ensure all public health aspects have been fully considered before any appendix of this nature is published.

SMITH: I agree with Chuck White as shown here: “I do not support these proposals related to direct potable water reuse and believe more clarification is needed.”

WHITE: I do not support these proposals related to direct potable water reuse and believe more clarification is needed.
Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: E 103.1 - E 103.8  Item #: 126

SUBMITTER: Markus Lenger  Chair, WE-Stand Direct Potable Water Use Task Group

RECOMMENDATION:  Accept as Modified

Request to accept the code change proposal as modified by this public comment.

E 103.0 System Requirements.

E 103.1 General. Direct potable use systems shall be designed in accordance with this appendix by a registered design professional, or a person who demonstrates competency to design direct potable use systems as required by the Authority Having Jurisdiction. Where deemed necessary by the registered design professional, considerations shall be made for non-regulated contaminants, including but not limited to, heavy metals, cleaning agents, and hormones. Chemotherapy pharmaceuticals shall not enter the direct potable water use system.

E 103.1 - E 103.2 Connections to Potable Water Supply. Onsite wastewater treatment systems shall have no direct connection to any potable water supply. Potable water shall be permitted to be used as makeup water for an onsite wastewater treatment system provided the potable water supply connection is protected by an airgap in accordance with the plumbing code.

E 103.1.1 Cross-Contamination. No person shall make a connection or allow one to exist between pipes or conduits carrying domestic water supplied by a public or private building supply system, and pipes, conduits, or fixtures containing or carrying water from any other source or containing or carrying water that has been used for any purpose whatsoever, or piping carrying chemicals, liquids, gases, or substances whatsoever, unless there is provided a backflow prevention device approved for the potential hazard and maintained in accordance with the plumbing code. Each point of use shall be separately protected where potential cross-contamination of individual units exists.

E 103.1.2 Cross-Connection Inspection and Testing. A cross-connection test is required in accordance with Section 601.11.2. 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.

E 103.3 Overflow. Raw water overflow shall be connected directly to the plumbing drainage system. The overflow piping 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.

E 103.4 Treated Water. Treated water shall be connected directly to an aerated storage tank capable of maintaining water quality in accordance with Section E 101.6. Storage tanks shall be protected from light intrusion. Storage tanks, linings, and coatings shall be listed to NSF/ANSI/CAN 61. Tank openings shall be protected to prevent the entrance of insects, birds, or rodents. Storage capacity shall be determined based on the estimated daily volume of wastewater and usage of potable water.

E 103.5 Diverter Valves. The onsite wastewater treatment system shall connect to the sanitary drainage system through a diverter valve(s) approved by the Authority Having Jurisdiction. At a minimum, a diverter valve shall be installed between the main drain line and the onsite treatment system. Additional diverter valves shall be permitted to be installed at other locations as specified by the registered design professional and the Authority Having Jurisdiction. Where toxins and contaminants are detected in accordance with Section E 103.7, raw water shall be diverted to the sewage system, and the diverter valve shall be reset only once safe operating conditions are met.

E 103.6 Isolation Valves. A means of isolation shall be provided between the treatment system and the plumbing system. Automatic shutoff shall be provided in accordance with Section E 103.7.

E 103.7 Monitoring and Controls. Onsite wastewater treatment systems shall be provided with a means of continuous monitoring of the treatment stages and shall be provided with a means of automatic shutoff when a malfunction occurs or when measured parameters are outside of the acceptable ranges specified by the Authority Having Jurisdiction. In the event of a malfunction, raw water shall be diverted to the sewage system, and the diverter valve shall be reset only once safe operating conditions are met.

Notes:
(1) Biological and pathogen parameters may only be measured by a qualified testing laboratory. Such testing requires multi-day turnaround for results. To control a system in real-time and react to water quality and flow fluctuations, reliable
online measurement technology should be deployed.

(2) The following types of sensors are available in the industry and provide reliable outputs:

(a) Flow rate
(b) Pressure
(c) Solid content
(d) Oxidation-reduction potential (ORP)
(e) Temperature
(f) pH
(g) Dissolved oxygen
(h) Turbidity
(i) Total Suspended Solids
(j) Conductivity
(k) Gas

**E 103.7 E 103.8 Validation.** Where required by the Authority Having Jurisdiction, treatment processes shall be tested to verify the pathogen reduction performance. The treatment processes shall be validated through third-party component validation or field verification using challenge testing. The results of the third-party component validation and/or challenge testing 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.

(shown for information purposes only)

**220.0 - R -**

Registered Design Professional. An individual who is registered or licensed by the laws of the state to perform such design work in the jurisdiction.

**Note:** NSF/ANSI/CAN 61 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**SUBSTANTIATION:**

Section E 103.1 (General) is being added to ensure that wastewater treatment systems are designed by registered design professionals. Language has also been included to address non-regulated contaminants such as heavy metals, cleaning agents, and hormones. While there currently exists no established acceptable parameters for hormone levels in potable water, the registered design professional is responsible for establishing remediation actions if there are potential negative effects on the treatment system. As these considerations vary dependent on residents within the dwelling unit, it is pertinent that such design specifications are determined on a case-by-case basis. However, in any case, treatment systems are not permitted to be used where any resident(s) are undergoing chemotherapy treatment.

Section E 103.4 (Treated Water) is being modified to include provisions for storage tanks containing treated water. The most appropriate standard for reference in this section is NSF/ANSI/CAN 61 (Drinking Water System Components – Health Effects). As stated within the scope and purpose of NSF/ANSI/CAN 61, “This standard establishes minimum health effects and requirements for the chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems. This standard is intended to cover specific materials or products that come into contact with drinking water, drinking water treatment chemicals, or both.”

Section E 103.5 (Diverter Valves) is being revised to include language which addresses situations where toxins and contaminants are detected at any point in the system. If the system controllers detect an unsafe condition or an error, it can no longer safely process water. In such a case, the raw incoming water must be diverted into the sanitary sewer or safely disposed of as required by the Authority Having Jurisdiction. A dedicated diverted valve is required for such an operation. The system may only start processing again once all errors have been cleared and safe operation has been confirmed. This may require a service call or site visit by an authorized technician. However, such provisions are necessary for the health and safety of the end users.
Item #: 127

WEStand 2023  Section: E 104.0 - E 104.4.1, Figure E 104.1, Table 1201.1

SUBMITTER: Markus Lenger
Chair, WE-Stand Direct Potable Water Reuse Task Group

RECOMMENDATION:
Add new text

**E 104.0 System Design.**

**E 104.1 General.** Onsite wastewater treatment systems shall be designed in accordance with this appendix and installed by a registered design professional. Onsite wastewater treatment systems covered by this appendix shall include the following treatment stages:

**Stage 1:** Solid separation in accordance with Section E 104.2.

**Stage 2:** Primary treatment in accordance with Section E 104.3.

**Stage 3:** Secondary treatment in accordance with Section E 104.4.

**Stage 4:** Electrolyte addition and remineralization.

(See Figure E 104.1 for a flow diagram of treatment stages utilized in DPR systems.)

**Note:** To eliminate a single point of failure in the sterilization stage, an additional method of filtration is recommended between Stage 3 and Stage 4. The recommended level of filtration is 0.05 micron (0.05 µm).

![Diagram of Onsite Wastewater Treatment Stages for DPR](image-url)
**E 104.2 Solid Separation.** Collected wastewater shall pass through a filter screen of not less than 18 mesh (1 mm) prior to primary treatment. Separated solids and organic matter from the wastewater shall be diverted to a treatment chamber. Wastewater shall be diverted to a designated basin or storage tank.

**E 104.3 Primary Treatment.** Separated solids and organic matter shall undergo heat sterilization or chemical disinfection prior to removal. Primary treatment for wastewater shall be completed by one or more of the following means:

1. Biological treatment,
2. Flocculation,
3. Coagulation,
4. Membrane filtration, or
5. Other equivalent method of treatment as approved by the Authority Having Jurisdiction.

Minimum standards for the biological oxygen demand (BOD), total suspended solids (TSS), and pH limitations shall be in accordance with the Authority Having Jurisdiction.

**E 104.4 Secondary Treatment.** Secondary treatment for wastewater shall be in accordance with this section, and Section E 104.4.1 through Section E 104.4.4.1. Treatment shall be completed by one or more of the following means:

1. Ultraviolet sterilization,
2. Ozone sterilization,
3. Chemical disinfection,
4. Nanofiltration,
5. Electrolysis, or
6. Other equivalent method of treatment as approved by the Authority Having Jurisdiction.

**E 104.4.1 UV Sterilization.** Where utilized, ultraviolet microbiological treatment systems shall be in accordance with NSF/ANSI 55. A minimum of 2 inline filters, one 5 micron (5 µm) filter followed by one 0.5-1 micron (0.5-1µm) filter, shall be installed prior to the UV disinfection system. UV systems shall deliver a minimum of 40 mJ/cm² (2.45 E-4 Btu/in²) at the minimum intensity specified by the manufacturer at the flow rates specified for the application.

**E 104.4.2 Ozone.** Design, installation, and commissioning of ozone systems shall comply with AWWA F120. Ozone systems shall be equipped with an airflow switch monitored by a controller as well as an oxidation reduction potential (ORP) sensor. The ORP reading of water shall not be less than 500 mV near the exit point of the system.

**E 104.4.3 Chlorination/Dechlorination.** In systems where chlorine is used for secondary treatment, the chlorine dosage shall be determined by the total chlorine level required for disinfection, and a means of dechlorination shall be provided to meet the potable water quality parameters for free chlorine as approved by the Authority Having Jurisdiction. Plans and procedures for dechlorination shall be in accordance with AWWA C655. Chlorine disinfection systems shall be equipped with ORP sensors, or equivalent, to determine the concentration of free available chlorine.

**E 104.4.4 Filtration.** The level of filtration shall be selected in accordance with the water quality requirements of Section E 101.6.

**E 104.4.4.1 Reverse Osmosis (RO).** Where installed, reverse osmosis water treatment systems shall be listed in accordance with NSF/ANSI 58 and ASSE 1086, or other equivalent standards, and shall be installed and maintained in accordance with the manufacturer’s specifications. Reverse osmosis water treatment systems shall be equipped with automatic shutoff valves to prevent discharge when there is no call for producing treated water. RO systems shall be selected and sized based on the following conditions:

1. Estimated volume of water to be disinfected (gal/day) (L/day).
2. Not less than a 20 percent variation in volume.
3. Lowest expected water temperature.

### TABLE 1201.1
**REFERRED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
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<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Performance Specification for Reverse Osmosis Water Efficiency – Drinking Water</td>
<td>E 104.4.4.1</td>
</tr>
<tr>
<td>AWWA C655-2009*</td>
<td>Field Dechlorination</td>
<td>E 104.4.3</td>
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<tr>
<td>AWWA F120-2018*</td>
<td>Ozone Systems for Water</td>
<td>E 104.4.2</td>
</tr>
<tr>
<td>NSF/ANSI 55-2020*</td>
<td>Ultraviolet Microbiological Water Treatment Systems</td>
<td>E 104.4.1</td>
</tr>
<tr>
<td>NSF/ANSI 58-2020*</td>
<td>Reverse Osmosis Drinking Water Treatment Systems</td>
<td>E 104.4.4.1</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

**Note:** ASSE 1086, AWWA C655, AWWA F120, NSF/ANSI 55, and NSF/ANSI 58 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.
The stages of treatment for a DPR system include solid separation, primary treatment, secondary treatment, and electrolyte addition. Where solids are separated out of the collected raw water, they must be treated before safe removal and approved disposal.

The primary treatment stage includes sterilization via heat, chemical disinfection, biological treatment, flocculation, coagulation, or membrane filtration. A means of secondary treatment is then required to further purify the wastewater through additional processes listed in Section E 104.4. Each of these treatment types is supported by definitions proposed in previous items by this Task Group. Figure E 104.1 also serves as a process flow diagram of the required treatment stages. Overall the layout of the section clearly states the needed treatment stages and appropriate methods of completing such treatment to ensure water quality and safety.

UV sterilization is an environmentally friendly method of treatment which removes a vast majority of harmful waterborne microorganisms. NSF 55 covers UV microbiological water treatment systems and components for point-of-use and point-of-entry (POE) applications. The standard is intended to establish minimum requirements for the reduction of microorganisms using ultraviolet (UV) radiation.

AWWA F120 provides a minimum set of requirements for ozone systems for the treatment of potable water, wastewater, reclaimed water, and storm water. This standard is intended to assist with the design, procurement, installation, and commissioning of ozone systems.

AWWA C655 describes procedures, materials, and requirements for the dechlorination of chlorinated water discharges. It includes current dechlorination regulations, chemical and nonchemical dechlorination, dechlorination plans and procedures, dechlorination methods, and verification.

NSF 58 establishes minimum requirements for materials, design and construction, and performance of reverse osmosis (RO) drinking water treatment systems. This Standard also specifies the minimum product literature that manufacturers shall supply to authorized representatives and owners, as well as the minimum service-related obligations that manufacturers shall extend to system owners.

ASSE 1086 covers water efficiency, automatic shut-off valves, and flow restrictor requirements for residential RO systems and performance testing to address the membrane life concerns of high efficiency RO membranes. This standard includes test requirements for complete systems or components (RO membrane, automatic shut off valve, flow restrictor).

Furthermore, the required level of filtration was selected based on particle sizing of bacteria and viruses. As the selected micron size effectively becomes a measure of the efficiency of a filter in terms of purity, it was necessary to provide the minimum level of filtration for secondary treatment. Nanofiltration was selected as it removes most organic molecules and nearly all viruses.

Reverse osmosis removes turbidity, including microbes and virtually all dissolved substances. In addition, this method of filtration also removes many harmful and healthy minerals. In cases where RO systems are employed, it is necessary to add minerals back into the water to increase pH and decrease corrosion potential within the residential plumbing system.

**COMMITTEE ACTION:** ACCEPT AS AMENDED BY THE TC

**E 104.0 System Design.**

**E 104.1 General.** Onsite wastewater treatment systems shall be designed in accordance with this appendix and installed by a registered design professional. Onsite wastewater treatment systems covered by this appendix shall include the following treatment stages:

- **Stage 1:** Solid separation in accordance with Section E 104.2.
- **Stage 2:** Primary treatment in accordance with Section E 104.3.
- **Stage 3:** Secondary treatment in accordance with Section E 104.4.
- **Stage 4:** Electrolyte addition and remineralization.

(See Figure E 104.1 for a flow diagram of treatment stages utilized in DPR systems.)

**Note:** To eliminate a single point of failure in the sterilization stage, an additional method of filtration is recommended between Stage 3 and Stage 4. The recommended level of filtration is 0.05 micron (0.05 µm).
E 104.2 Solid Separation. Collected wastewater shall pass through a filter screen of not less than 18 mesh (1 mm) prior to primary treatment. Separated solids and organic matter from the wastewater shall be diverted to a treatment chamber. Wastewater shall be diverted to a designated basin or storage tank.

E 104.3 Primary Treatment. Separated solids and organic matter shall undergo heat sterilization or chemical disinfection prior to removal. Primary treatment for wastewater shall be completed by one or more of the following means:
(1) Biological treatment,
(2) Flocculation,
(3) Coagulation,
(4) Membrane filtration, or
(5) Other equivalent method of treatment as approved by the Authority Having Jurisdiction.

Minimum standards for the biological/biochemical oxygen demand (BOD), total suspended solids (TSS), and pH limitations shall be in accordance with the Authority Having Jurisdiction.

E 104.4 Secondary Treatment. Secondary treatment for wastewater shall be in accordance with this section, and Section E 104.4.1 through Section E 104.4.4.1. Treatment shall be completed by one or more of the following means:
(1) Ultraviolet sterilization,
(2) Ozone sterilization,
(3) Chemical disinfection,
(4) Nanofiltration,
(5) Electrolysis, or
(6) Other equivalent method of treatment as approved by the Authority Having Jurisdiction.

E 104.4.1 UV Sterilization. Where utilized, ultraviolet microbiological treatment systems shall be in accordance with NSF/ANSI 55, Class A systems. A minimum of 2 inline filters, one 5 micron (5 µm) filter followed by one 0.5-1 micron (0.5-1µm) filter, shall be installed prior to the UV disinfection system. UV systems shall deliver a minimum of 40 mJ/cm² (2.45 E-4 Btu/in²) at the minimum intensity specified by the manufacturer at the flow rates specified for the application.

E 104.4.2 Ozone. Design, installation, and commissioning of ozone systems shall comply with AWWA F120. Ozone systems shall be equipped with an airflow switch monitored by a controller as well as an oxidation reduction potential (ORP) sensor. The ORP reading of water shall not be less than 500 mV near the exit point of the system.

E 104.4.3 Chlorination/Dechlorination. In systems where chlorine is used for secondary treatment, the chlorine dosage shall be determined by the total chlorine level required for disinfection, and a means of dechlorination shall be provided to meet the potable water quality parameters for free chlorine as approved by the Authority Having Jurisdiction. Plans and procedures for dechlorination shall be in accordance with AWWA C655. Chlorine disinfection systems shall be equipped with ORP sensors, or equivalent, to determine the concentration of free available chlorine.
E 104.4.4 Filtration. The level of filtration shall be selected in accordance with the water quality requirements of Section E 101.6.

E 104.4.4.1 Reverse Osmosis (RO). Where installed, reverse osmosis water treatment systems shall be listed in accordance with NSF/ANSI 58 and ASSE 1086, or other equivalent standards, and shall be installed and maintained in accordance with the manufacturer’s specifications. Reverse osmosis water treatment systems shall be equipped with automatic shutoff valves to prevent discharge when there is no call for producing treated water. RO systems shall be selected and sized based on the following conditions:
(1) Estimated volume of water to be disinfected (gal/day) (L/day).
(2) Not less than a 20 percent variation in volume.
(3) Lowest expected water temperature.

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(COMMITTEE STATEMENT:
Since the provided requirement for UV systems to deliver a minimum of 40 mJ/cm² is consistent with Class A systems in NSF/ANSI 55, the proposal is being modified to make this distinction and remove unneeded language.

TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS: AFFIRMATIVE: 20 NEGATIVE: 8 NOT RETURNED: 2 CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:
KOELLER: I agree with the comments by Mr. Markus Lenger.
LENGER: As the proponent, I agree that references to the existing standards need to be revised/clarified as they are used to reference desired water quality parameters, not the technology used. As to the statements that the technologies listed are not able to achieve the stated water quality, they are false. The listed treatment trains achieve the desired quality, as they are used in all existing treatment systems. The descriptions are not specific enough to state that the performance is NOT achievable. The purpose of this appendix is to leave that up to the designers.

EXPLANATION OF NEGATIVE:
ALLEN: I support the intent of this proposal and had voted affirmative. However, it's come to my attention that the listed product standards for the RO section conflict with the quality of incoming water. This seems like an easy fix for public comment.

Standard 58 section 1.2: “The point-of-use (POU) RO drinking water treatment systems addressed by this standard are designed to be used for the reduction of specific substances that may be present in drinking water (public or private) considered to be microbiologically safe and of known quality”.

From 1086: “Residential Reverse Osmosis (RO) systems are used to treat drinking water.”

BARNES: I support the intent of this proposal however I cannot support it as written. Products certified to the referenced standards (NSF 55, 58 and 1086) are intended to be used on a potable water source. The following are quotes directly from those standards:

NSF/ANSI 58 section 1.2: “The point-of-use (POU) RO drinking water treatment systems addressed by this standard are designed to be used for the reduction of specific substances that may be present in drinking water (public or private) considered to be microbiologically safe and of known quality.”
ASSE 1086: “Residential Reverse Osmosis (RO) systems are used to treat drinking water.”

NSF/ANSI 55: “Systems covered by this standard are not intended for the treatment of water that has an obvious contamination or intentional source, such as raw sewage, nor are systems intended to convert wastewater to drinking water. The systems are intended to be installed on visually clear water (not colored, cloudy, or turbid).”

The quality of water that will result from the primary treatment stage defined in this proposal will not meet potable water standards and therefore it would be inappropriate to apply the above listed standards to this application. Products certified to these standards may not perform as expected in the proposed wastewater treatment application.

KENDZEL: It is understood that Appendices to WE•Stand can be considered for adoption at the local level. This proposal is not ready to be published as an Appendix written on code language. The consideration of adopting the onsite treatment of wastewater for direct potable water use requires a significant more amount of work and involvement of the appropriate government agencies to ensure all public health aspects have been fully considered before any appendix of this nature is published.

MCLEOD: The standards need to be investigated in more detail.

PREMER: I agree with the comments listed, nothing more to add.

SMITH: I agree with Chuck White as written here: “I do not support these proposals related to direct potable water reuse and believe more clarification is needed. Additionally, this proposal says these will be installed by registered design professionals. Design professionals will likely not do the installation.”

TABAKH: I agree with the comments listed.

WHITE: I do not support these proposals related to direct potable water reuse and believe more clarification is needed. Additionally, this proposal says these will be installed by registered design professionals. Design professionals will likely not do the installation.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: E 104.0 - E 104.5.2  Item #: 127
SUBMITTER: Markus Lenger  Chair, WE-Stand Direct Potable Water Use Task Group  Comment #: 1

RECOMMENDATION: Accept as Modified

Request to accept the code change proposal as modified by this public comment.

E 104.0 System Design.
E 104.1 General. Onsite wastewater treatment systems shall be designed in accordance with this appendix and installed by a registered design professional. Onsite wastewater treatment systems covered by this appendix shall include the following treatment stages:

Stage 1: Solid separation in accordance with Section E 104.2.
Stage 2: Primary treatment in accordance with Section E 104.3.
Stage 3: Secondary treatment in accordance with Section E 104.4.
Stage 4: Tertiary treatment in accordance with Section E 104.5.
Stage 5: Storage after treatment in accordance with Section E 103.4.
Stage 46: Electrolyte addition, carbon filtration, and remineralization.

(See Figure E 104.1 for a flow diagram of treatment methods and stages utilized in DPR direct potable use systems.)

Notes:
(1) To eliminate a single point of failure in the sterilization sanitation stage, an additional method of filtration is recommended between Stage 3 and Stage 4. The recommended level of filtration is 0.05 micron (0.05 µm).
(2) Where approved by the registered design professional, storage may be provided after any treatment stage.
FIGURE E 104.1
ONSITE WASTEWATER TREATMENT STAGES FOR DPR DIRECT POTABLE USE\textsuperscript{1,2,3,4}

Notes:
\textsuperscript{1} Nanofiltration may be utilized in either the secondary or tertiary treatment stages, or both, dependent upon the desired level of water quality. Repetitive use of nanofiltration adds reliability to the treatment system and reduces system malfunction.
\textsuperscript{2} The control system may be utilized to monitor the storage tank and initiate polishing by means of recirculating the treated water back through the primary, secondary, and tertiary treatment stages. Storage tank monitoring methods may include, but are not limited to, conductivity sensors, flow meters measuring depletion volumes, timers to initiate automatic turnover, and water temperature sensors.
\textsuperscript{3} Carbon filtration may be utilized as a means of taste enhancement for stored treated water.
\textsuperscript{4} Where approved by the registered design professional, storage may be provided after any treatment stage.
E 104.2 Solid Separation. Collected wastewater shall pass through a filter screen of not less than 18 mesh (1 mm) prior to primary treatment. Separated solids and organic matter from the wastewater shall be diverted to a treatment chamber. Wastewater shall be diverted to a designated basin or storage tank.

E 104.3 Primary Treatment. Separated solids and organic matter shall undergo heat-sterilization or chemical disinfection prior to removal. Primary treatment for wastewater shall be completed by one or more of the following means:
(1) Biological treatment,
(2) Flocculation,
(3) Coagulation, or
(4) Membrane filtration, or
(5) Other equivalent method of treatment as approved by the Authority Having Jurisdiction.

Minimum standards for the biochemical oxygen demand (BOD), total suspended solids (TSS), and pH limitations shall be in accordance with the Authority Having Jurisdiction.

E 104.4 Secondary Treatment. Secondary treatment for wastewater shall be in accordance with this section, and Section E 104.4.1 through Section E 104.4.5. Treatment shall be completed by one or more of the following means:
(1) Ultraviolet sterilization,
(2) Chemical disinfection,
(3) Electrolysis, or
(4) Aerobic reactors,
(5) Nanofiltration,
(5) Ozone sterilization or
(6) Other equivalent method of treatment as approved by the Authority Having Jurisdiction.

E 104.4.1 Ozone. Design, installation, and commissioning of ozone systems shall comply with AWWA F120. Ozone systems shall be equipped with an airflow switch monitored by a controller as well as an oxidation reduction potential (ORP) sensor. The ORP reading of water shall not be less than 500 mV near the exit point of the system.

E 104.4.2 Chlorination/Dechlorination. In systems where chlorine is used for secondary treatment, the chlorine dosage shall be determined by the total chlorine level required for disinfection, and a means of dechlorination shall be provided to meet the potable water quality parameters for free chlorine as approved by the Authority Having Jurisdiction. Plans and procedures for dechlorination shall be in accordance with AWWA C655. Chlorine disinfection systems shall be equipped with ORP sensors, or equivalent, to determine the concentration of free available chlorine.

E 104.4.3 Filtration. The level of filtration shall be selected in accordance with the water quality requirements of Section E 101.6.

E 104.5 Tertiary Treatment. Tertiary treatment for wastewater shall be in accordance with this section, Section E 104.5.1, and Section E 104.5.2. Treatment shall be completed by one or more of the following means:
(1) Nanofiltration,
(2) Reverse Osmosis (RO),
(3) Ultraviolet (UV) sterilization,
(4) Other equivalent method of treatment as approved by the Authority Having Jurisdiction.

E 104.4.4 Reverse Osmosis (RO). Where installed, reverse osmosis water treatment systems shall be listed in accordance with NSF/ANSI 58 and ASSE 1086, or other equivalent standards, and shall be installed and maintained in accordance with the manufacturer’s specifications.

Exception: Where approved by the registered design professional, the waste stream on the RO system shall be rerouted back into the water treatment system, and compliance with ASSE 1086 shall not be required.

Reverse osmosis water treatment systems shall be equipped with automatic shutoff valves to prevent discharge when there is no call for producing treated water. RO systems shall be selected and sized based on the following conditions:
(1) Estimated volume of water to be disinfected (gal/day) (L/day).
(2) Not less than a 20 percent variation in volume (gal) (L).
(3) Lowest expected water temperature (^F) (^C).

Note: ASSE 1086 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
Section E 104.0 (System Design), including Figure E 104.1 (Onsite Wastewater Treatment Stages for Direct Potable Use), has been updated to include additional treatment stages within the direct potable use system. This was done to ensure that treatment provisions and referenced standards align with their applicability and scope.

For example, both UV sterilization and reverse osmosis have been relocated under Section E 104.5 (Tertiary Treatment). At this point within the treatment system, the collected water has already gone through solid separation, biological disinfection, sanitization, and various levels of filtration which are sufficient to ensure that visually clear water is introduced into this part of the treatment chain. The tertiary treatment stage then offers additional sterilization or filtration to further purify the treated water.
It should be noted that the intent of Section E 104.0 is to convey a system design objective versus product or design restrictive terminology. The objective of the requirements is for the system to have an acceptable output water quality and at the same time allow for flexibility and variation in design.

With respect to the standards in question that are referenced for product compliance (i.e., NSF/ANSI 55, NSF/ANSI 58 and ASSE 1086). The inclusion of these requirements in the text of this proposal is to both allow multiple options for the system designers and to limit the actual products used to those which have been certified.

Figure E 104.1 now includes additional stages in the treatment system to cover tertiary treatment and storage of treated water. The flow diagram incorporates all modifications made in-text and offers new informative language regarding control systems, nanofiltration, and carbon filtration. Such language offers needed clarity for the registered design professional and is beneficial when interpreting the flow diagram.
Proposals

Item #: 132
WEStand 2023  Section: Figure F 301.1(1) - Figure F 301.1(9)

SUBMITTER: Laura Allen
Chair, WE-Stand Gray Water Ready Plumbing Task Group

RECOMMENDATION:
Add new text

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**FIGURE F 301.1(1)**
GRAY WATER DRAINAGE SYSTEM— DIVERTER VALVE IN CRAWL SPACE

For SI units: 1 inch = 25 mm
FIGURE F 301.1(2)
GRAY WATER DRAINAGE SYSTEM – SINGLE FIXTURE ON SECOND FLOOR NEAR EXTERIOR WALL
For SI units: 1 inch = 25 mm

FIGURE F 301.1(3)
GRAY WATER DRAINAGE SYSTEM – SINGLE FIXTURE ON SECOND FLOOR WITH STUB-OUT ABOVE GRADE, FROM CRAWL SPACE UNDER THE FIRST FLOOR
For SI units: 1 inch = 25 mm
FIGURE F 301.1(4)
GRAY WATER DRAINAGE SYSTEM – MULTIPLE FIXTURES ON CONCRETE SLAB FOUNDATION

For SI units: 1 inch = 25 mm
Note: A dedicated electrical receptacle should be installed not less than 10 feet (3048 mm) away from the stub out to ensure that power is available for a future gray water system pump.

FIGURE F 301.1(5)
GRAY WATER DRAINAGE SYSTEM – GRAYWATER PIPING EXTENDS OUTSIDE SLAB FOR ACCESS, THEN RETURNS INTO SLAB TO JOIN OTHER DRAINAGE PIPING

For SI units: 1 inch = 25 mm
Note: A dedicated electrical receptacle should be installed not less than 10 feet (3048 mm) away from the stub out to ensure that power is available for a future gray water system pump.
FIGURE F 301.1(6)
GRAY WATER DRAINAGE SYSTEM – CLOTHES WASHER GRAYWATER SYSTEM WHERE GRAYWATER IRRIGATION PIPE IS RUN THROUGH CRAWLSPACE

For SI units: 1 inch = 25 mm

Notes:
1. The union is necessary to provide access for maintenance of the standpipe and trap.
2. The air admittance valve prevents accidental siphoning of the washing machine and is installed at the highest elevation of the piping on the irrigation side of the diverter valve.

FIGURE F 301.1(7)
GRAY WATER DRAINAGE SYSTEM – CLOTHES WASHER GRAYWATER SYSTEM WHERE CLOTHES WASHER IS NEAR AN EXTERIOR WALL OR ON A CONCRETE SLAB FOUNDATION

For SI units: 1 inch = 25 mm
FIGURE F 301.1(8)
OVERVIEW OF A GRAVITY-FLOW, BRANCHED DRAIN SYSTEM

For SI units: 1 inch = 25 mm

FIGURE F 301.1(9)
OVERVIEW OF PUMPED GRAYWATER TO IRRIGATION SYSTEM

For SI units: 1 inch = 25 mm

Notes:
1 Check with AHJ for surge tank venting requirements.
2 A dedicated electrical receptacle should be installed not less than 10 feet (3048 mm) away from the stub out or pump basin to ensure that power is available for a future gray water system pump.
SUBSTANTIATION:
Figure F 301.1(1) through Figure F 301.1(9) have been included to assist users of the appendix in visualizing the listed requirements. Offering a wide variety of detailed figures ensures that provisions are understood and implemented correctly.

Figure F 301.1(1) illustrates graywater being collected from a first-floor shower/bath, with the diverter valve located in the crawlspace or basement.

Figure F 301.1(2) shows graywater being collected from a second-story shower/bath, with the diverter valve located below the bathroom inside the wall of the first floor.

Figure F 301.1(3) shows the same plumbing set-up as installed in Figure F 301.1(2), except the shower/bath drain pipe runs through the first floor and into the crawlspace. The graywater stub-out is located outside of the exterior crawl space foundation wall or crawl space vent, above grade. This configuration may be applicable when fixtures are located in the interior of the building and a stub-out can't be piped easily through an exterior wall above floor level.

Figure F 301.1(4) shows graywater diversion from the shower/bath and clothes washing machine in a house with a slab-on-grade foundation, where the diverter valve is located outside the building envelope in a subsurface enclosure (i.e., an irrigation valve box). The subsurface enclosure containing the diverter valve needs to be permanently accessible (i.e., no structures or hardscape covering it). The diverter valve should be positioned as high as possible in the enclosure to ensure graywater can drain at a 1/4 inch per 12 inch slope into a future gravity irrigation system or pump basin.

Figure F 301.1(5) demonstrates how to make graywater from a tub/shower (or other fixture) accessible when the bathroom is on a slab and the main drain is in another area of the building. The tub/shower drain has been directed through the slab and perimeter foundation to a subsurface enclosure (i.e., an irrigation valve box). A diverter valve and backwater valve are located in the box, providing a graywater stub out. The tub/shower drain then loops back through the foundation and into the slab to proceed to where it connects with the building's other drainage piping. 1/4 inch per 12 inches of slope must be carefully maintained on this loop piping.

Figure F 301.1(6) illustrates laundry-to-landscape piping in a building with a crawl space.

Figure F 301.1(7) illustrates laundry to landscape piping in a slab on grade building. A diverter valve is mounted to the wall in an access panel and connected directly to the discharge hose of the clothes washer.

Figure F 301.1(8) demonstrates a conceptual image of how a gravity-flow, branched drain graywater system transports graywater to multiple landscape plants without a storage tank or pump.

Figure F 301.1(9) shows graywater from a lavatory and tub/shower being made available for irrigation.
All of figures were gathered from the Guidance on Ordinance Compliance in Illustrations which may be accessed via the following link:

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 27  NEGATIVE: 1  NOT RETURNED: 2  CRAWFORD, WILLIAMS

EXPLANATION OF AFFIRMATIVE:
ALLEN: As the proponent, I plan to check back in with the task group and incorporate the concerns I heard at the TC meeting, for example, not calling-out specific pipe material in the images. I think the images are important to include in the appendix as they turn the concept of graywater ready plumbing into what a builder would actually need to do to comply with it.

EXPLANATION OF NEGATIVE:
WHITE: The illustrations show some issues with this concept. The use of diverter valves seems to show an issue for cleaning out the line through the diverter valve, and it does not appear they are sanitary pattern valves. Also, the use of splitter fittings (double elbows) would present cleanout issues.
PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: Figure F 301.1(1), Figure F 301.1(6) - Figure F 301.1(8)  Item #: 132

SUBMITTER: Laura Allen
Grewater Action
Comment #: 1

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

FIGURE F 301.1(1)
GRAY WATER DRAINAGE SYSTEM– DIVERTER VALVE IN CRAWL SPACE
FIGURE F 301.1(6)
GRAY WATER DRAINAGE SYSTEM – CLOTHES WASHER GRAYWATER SYSTEM WHERE GRAYWATER IRRIGATION PIPE IS RUN THROUGH CRAWLSPACE

For SI units: 1 inch = 25 mm

Notes:
1 The union is necessary to provide access for maintenance of the standpipe and trap.
2 The air admittance valve prevents accidental siphoning of the washing machine and is installed at the highest elevation of the piping on the irrigation side of the diverter valve.
FIGURE F 301.1(7)
GRAY WATER DRAINAGE SYSTEM – CLOTHES WASHER GRAYWATER SYSTEM WHERE CLOTHES WASHER IS NEAR AN EXTERIOR WALL OR ON A CONCRETE SLAB FOUNDATION

For SI units: 1 inch = 25 mm
FIGURE F 301.1(8)
OVERVIEW OF A GRAVITY-FLOW, BRANCHED DRAIN SYSTEM

For SI units: 1 inch = 25 mm

SUBSTANTIATION:
These images are to support the new Appendix F. Though the original proposal passed, several people brought up the issue of calling out materials in the drawing as problematic since the specific material used may vary based on regional conditions. This proposal intends to fix that and remove mention of specific materials (ABS or PVC) while keeping the useful information.

The following revisions were made:
Figure F 301.1 (1)- Removed “ABS” label
Figure F 301.1 (6)- Removed “Schedule 40 PVC” label
Figure F 301.1 (7)- Removed “Schedule 40 PVC” label
Figure F 301.1 (8)- Removed “ABS” labels
APPENDIX G
WATER EFFICIENCY RATINGS

G 101.0 General.
G 101.1 Applicability. This appendix establishes criteria for the use of water efficiency ratings applicable to residential properties containing single-family dwellings. Properties shall also meet the water efficiency and conservation requirements specified in Section 402.0 and Section 403.0, as applicable to residential applications.

G 102.0 Water Efficiency Ratings.
G 102.1 General. Properties shall be evaluated for water efficiency by one of the following methods:
(1) EPA WaterSense Specification for Homes,
(2) RESNET/ICC 850, or
(3) Water Efficiency Rating Score (WERS)
G 102.2 Compliance. The rated proposed design and confirmed built property shall have a water efficiency rating not exceeding 65 when compared to the water rating’s reference design.
Exception: Where the EPA WaterSense Specification for Homes is used to evaluate water efficiency, the property shall be certified to the WaterSense labeled home specification.
G 102.3 Validation. Properties shall be inspected for compliance by a home verifier, certified rater, or rating field inspector based on the water efficiency rating methodology and certifying agency selected.
G 102.4 Certification. Where properties are certified for compliance, a certificate shall be provided to the property owner including the following information:
(1) Name of the certifying organization.
(2) Address of the property.
(3) Water efficiency rating assigned.
(4) Name of the verifier, rater, or inspector.
(5) Date of certification.
G 102.5 Additional Documentation. Upon request, the following documentation shall be provided to the Authority Having Jurisdiction:
(1) Documentation with the property component characteristics of the water rating reference design.
(2) A certification signed by the builder or property owner providing the property component characteristics of the rated proposed design.
(3) Documentation of the actual values used in the water rating calculations for the confirmed built property.
### Table 1201.1

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<th>STANDARD NUMBER-YEAR</th>
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<th>REFERENCED SECTION</th>
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<td>EPA WaterSense-2021</td>
<td>Specification for Homes</td>
<td>G 102.1, G 102.2</td>
</tr>
<tr>
<td>RESNET/ICC 850-2020*</td>
<td>Calculation and Labeling of the Water Use Performance of One- and Two-Family Dwellings Using the Water Rating Index</td>
<td>G 102.1</td>
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</tbody>
</table>

(portion of table not shown remains unchanged)

**Note:** The EPA WaterSense Specification for Homes and RESNET/ICC 850 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**Substantiation:**

The proposed new appendix supports water efficient residential design by providing available methodologies and validation measures along with appropriate backstops. Since there are multiple water efficiency rating systems, all with their own approach for determining efficiencies, the Task Group consulted with representatives from both RESNET and WERS to ensure compatibility with the proposed language.

Additionally, a representative from EPA WaterSense assisted the Task Group with ensuring the reference to the Specification for Homes was appropriately addressed. This review was pertinent for clarity on the intent of the listed methodologies since the Specification for Homes utilizes available rating systems to compare efficiencies with standard construction.

The language in Section G 102.3 through Section G 102.5 adds basic requirements for validation and certification based on the selected method of evaluating water efficiency. For evident reasons, the residential property must be inspected for compliance by a home verifier, certified rater, or rating field inspector.

Such language is beneficial as these water efficiency evaluation methods and agencies allow for independent confirmation of the water-saving practices of residential projects. Furthermore, the proposed language is designed to help expand the reach of WE•Stand into the single-family sector. For these reasons, the proposal is valuable to the code and promotes more sustainable requirements for water efficiency and conservation.

The EPA WaterSense Specification for Homes may be accessed via the following link: https://www.epa.gov/sites/default/files/2021-02/documents/watersense_final_homes_specification_v2.0.pdf

Information pertaining to WERS may be accessed via the following link: https://www.wers.us/

**Committee Action:** Accept as Amended by the TC

### Appendix G

**Water Efficiency Ratings**

**G 101.0 General.**

**G 101.1 Applicability.** This appendix establishes criteria for the use of water efficiency ratings applicable to residential properties containing single-family dwellings. Properties shall also meet the water efficiency and conservation requirements specified in Section 402.0 and Section 403.0, as applicable to residential applications.

**G 102.0 Water Efficiency Ratings.**

**G 102.1 General.** Properties shall be evaluated for water efficiency by one of the following methods:

1. EPA WaterSense Specification for Homes,
2. RESNET/ICC 850, or
3. Water Efficiency Rating Score (WERS)

**Exception:** Where the property to be rated includes a water softener, the Water Efficiency Rating Score (WERS) or the EPA WaterSense Specification for Homes shall be used.
G 102.2 Compliance. The rated proposed design and confirmed built property shall have a water efficiency rating not exceeding 65 when compared to the water rating’s reference design.

**Exception:** Where the EPA WaterSense Specification for Homes is used to evaluate water efficiency, the property shall be certified to the WaterSense labeled home specification.

G 102.3 Validation. Properties shall be inspected for compliance by a home verifier, certified rater, or rating field inspector based on the water efficiency rating methodology and certifying agency selected.

G 102.4 Certification. Where properties are certified for compliance, a certificate shall be provided to the property owner including the following information:

1. Name of the certifying organization.
2. Address of the property.
3. Water efficiency rating assigned.
4. Name of the verifier, rater, or inspector.
5. Date of certification.

G 102.5 Additional Documentation. Upon request, the following documentation shall be provided to the Authority Having Jurisdiction:

1. Documentation with the property component characteristics of the water rating reference design.
2. A certification signed by the builder or property owner providing the property component characteristics of the rated proposed design.
3. Documentation of the actual values used in the water rating calculations for the confirmed built property.

**TABLE 1201.1**

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(portion of table not shown remains unchanged)

**COMMITTEE STATEMENT:**

The Water Efficiency Rating Score (WERS) and the EPA WaterSense Specification for Homes promote water conservation for water softeners in ways that do not contradict established North American Standards. Meanwhile, the RESNET/ICC 850 rating system is inconsistent with those established standards, and the adoption of RESNET/ICC 850 would cause unintended consequences.

**TOTAL ELIGIBLE TO VOTE:** 30

**VOTING RESULTS:**

- **AFFIRMATIVE:** 17
- **NEGATIVE:** 11
- **NOT RETURNED:** 2

**CRAWFORD, WILLIAMS**

**Note:** Item # 133 failed to achieve the necessary two-thirds affirmative vote of returned ballots. In accordance with Section 6.8.2 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard, a public comment is requested for this proposal. The Technical Committee will reconsider this proposal as a public comment.

**EXPLANATION OF AFFIRMATIVE:**

**BARNES:** The amendment to the proposal in necessary as the RESNET/ICC 850 efficiency rating system restricts softening below 10 grains of hardness per gallon of water (gpg) which is inconsistent with long established North American Standards. The current definition of soft water and softening established within North American Standards is based on removing hardness down to <1gpg. Multiple industries rely upon these North American Standards for product design and warranties. Therefore, using the RESNET/ICC rating system on homes that include a water softener will have unintended consequences for many American homeowners and other stakeholders.

**KENDZEL:** I am in support of the amendment to the proposal. Based on the concerns raised by the WQA representative during the meeting, I believe the proponent of the proposal needs to provide a sound technical justification for penalizing water softeners used in homes based on a limit of 10 grains of hardness per gallon as well as the potential impact of this limitation on both the industry and the consumer. The RESNET standard provides
an equation on this issue but the proponent of the proposal 131 provides no technical rational for the use of the 10
gpg. Until this issue is resolved I am uncomfortable not having an exception for water softeners in the proposal, as
approved by the Committee at our June meeting. I am comfortable in having an exception for one of the three Water
Efficiency programs for water heaters since there are two other options available.

MCLEOD: I do not see enough technical justification to support the limitation.

EXPLANATION OF NEGATIVE:

ALLEN: I agree with the other comments. I support the original proposal but not the amendment.

KLEIN: I agree with the proposal, but not the amendment. In most cases, water used for drinking should not be
softened, but in most retrofit systems all of the water is softened because the system is installed on all of the piping
to the building. In addition, the recommended level of softening is too much. And, the sizing of the softeners is
based on very unrealistic amounts of water use. The RESNET standard was heavily debated, and its
recommendation should stand, perhaps even strengthened.

KOELLER: The proposed committee action would preclude the ANSI/RESNET/ICC 850 water efficiency rating
system in any home with a water softener. The assertion that North American standards are "contradicted" by the
use of Standard 850 is unfounded. If Standard 850 actually contradicted any established standard, it should be
taken up with ANSI. Instead, with this proposal, a trade association seeks to foster the marketing of water softeners
in locations without significantly hard water. Standard 850 does not penalize homes with water softeners, but rather
it properly accounts for water softener water use in locations without hard water.

LANDO: The proposed committee action would preclude the ANSI/RESNET/ICC 850 water efficiency rating system
in any home with a water softener. The assertion that North American standards are "contradicted" by the use of
Standard 850 is unfounded. If Standard 850 actually contradicted any established standard, it should be taken up
with ANSI. Instead, with this proposal, a trade association seeks to foster the marketing of water softeners in
locations without significantly hard water. Standard 850 does not penalize homes with water softeners, but rather it
properly accounts for water softener water use in locations without hard water.

LANAGING: I agree with prior comments. Further substantiation is needed for the proposal.

LENGER: Agree with all arguments.

OSANN: The proposed committee action would preclude the ANSI/RESNET/ICC 850 water efficiency rating system
in any home with a water softener. The assertion that North American standards are "contradicted" by the use of
Standard 850 is unfounded. If Standard 850 actually contradicted any established standard, it should be taken up
with ANSI. Instead, with this proposal, a trade association seeks to foster the marketing of water softeners in
locations without significantly hard water. Standard 850 does not penalize homes with water softeners, but rather it
properly accounts for water softener water use in locations without hard water.

PAPE: The proposed committee action would preclude the ANSI/RESNET/ICC 850 water efficiency rating system in
any home with a water softener. The assertion that North American standards are "contradicted" by the use of
Standard 850 is unfounded. If Standard 850 actually contradicted any established standard, it should be taken up
with ANSI. Instead, with this proposal, a trade association seeks to foster the marketing of water softeners in
locations without significantly hard water. Standard 850 does not penalize homes with water softeners, but rather it
properly accounts for water softener water use in locations without hard water.

PREMER: Further substantiation is needed for proposal.

SOVOCOOL: Agree with the others and urge all to vote negative on this now with this change (acknowledgement: this
was originally from the workgroup I chaired). It is unfortunate this single issue derailed ANSI/RESNET/ICC 850
cross-incorporation.

TABAKH: I agree with the arguments against.

Appended Comments
PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: Appendix G  Item #: 133
SUBMITTER: Kent Sovocool  Chair, WE-Stand Efficiency Rating Task Group

RECOMMENDATION:
Accept as Submitted

Request to accept the code change proposal as submitted by this public comment.

SUBSTANTIATION:
As committee chair, I am advocating for restoring the inclusion of ANSI/RESNET/ICC 850 as an acceptable Water Efficiency Rating method (Section 102.1) by restoring the original proposal without the amendment (i.e., the exception) added later during the Technical Committee Meeting. I originally supported this initiative and our committee worked to include ANSI/RESNET/ICC 850 but ended up having to vote negative on its ballot, along with many other committee members. This is because it was degraded by an exception created explicitly to prevent its use when a water softener is present in a new property.

Standard ANSI/RESNET/ICC 850 is, obviously, an ANSI standard that has gone through the same debate and vetting as all such standards. The reason it is being prevented as a rating method is because in situations where water is already soft, it restricts the use of softening which always drives up water use due to recharge operation. This is an entirely appropriate consideration in a water efficiency standard. We must not degrade the credibility of the standard by effectively promoting water softeners where they are unnecessary. While maybe the trade association responsible for pushing the amendment could make a case for something such as this in base code, again, this is a water efficiency standard. Fostering the installation of softeners in this way, by denying use of an entire standard, is egregious and would damage the standard and IAPMO. We need to restore the original language allowing ANSI/RESNET/ICC 850 to be a rating method unimpaired by a special interest.

PUBLIC COMMENT 2

Code Year: 2023 WEStand  Section #: Appendix G  Item #: 133
SUBMITTER: Samantha Barnes, Eric Yeggy  Water Quality Association

RECOMMENDATION:
Accept as Modified

Request to replace the code change proposal by this public comment.

APPENDIX G
WATER EFFICIENCY RATINGS

G 101.0 General.
G 101.1 Applicability. This appendix establishes criteria for the use of water efficiency ratings applicable to residential properties containing single-family dwellings. Properties shall also meet the water efficiency and conservation requirements specified in Section 402.0 and Section 403.0, as applicable to residential applications.

G 102.0 Water Efficiency Ratings.
G 102.1 General. Properties shall be evaluated for water efficiency by one of the following methods:
(1) EPA WaterSense Specification for Homes,
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(3) Water Efficiency Rating Score (WERS)
Exception: Where the property to be rated includes a water softener, the Water Efficiency Rating Score (WERS) or the EPA WaterSense Specification for Homes shall be used.
G 102.2 Compliance. The rated proposed design and confirmed built property shall have a water efficiency rating not exceeding 65 when compared to the water rating’s reference design.

Exception: Where the EPA WaterSense Specification for Homes is used to evaluate water efficiency, the property shall be certified to the WaterSense labeled home specification.

G 102.3 Validation. Properties shall be inspected for compliance by a home verifier, certified rater, or rating field inspector based on the water efficiency rating methodology and certifying agency selected.

G 102.4 Certification. Where properties are certified for compliance, a certificate shall be provided to the property owner including the following information:
(1) Name of the certifying organization.
(2) Address of the property.
(3) Water efficiency rating assigned.
(4) Name of the verifier, rater, or inspector.
(5) Date of certification.

G 102.5 Additional Documentation. Upon request, the following documentation shall be provided to the Authority Having Jurisdiction:
(1) Documentation with the property component characteristics of the water rating reference design.
(2) A certification signed by the builder or property owner providing the property component characteristics of the rated proposed design.
(3) Documentation of the actual values used in the water rating calculations for the confirmed built property.

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<td>Calculation and Labeling of the Water Use Performance of One- and Two-Family Dwellings Using the Water Rating Index</td>
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</table>

Note: The EPA WaterSense Specification for Homes and RESNET/ICC 850 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:

Samantha Barnes:
I am in support of the amended proposal that was originally accepted by the Technical Committee during their last meeting. At that meeting the Technical Committee agreed that “The Water Efficiency Rating Score (WERS) and the EPA WaterSense Specification for Homes promote water conservation for water softeners in ways that do not contradict established North American Standards. Meanwhile, the RESNET/ICC 850 rating system is inconsistent with those established standards, and the adoption of RESNET/ICC 850 would cause unintended consequences” (quoted Committee Statement from the ROP).

Although this item failed to achieve the necessary 2/3 affirmative vote to pass, the amendment to the original proposal is justified and is necessary as the RESNET/ICC 850 efficiency rating system penalizes for softening below 10 grains of hardness per gallon of water (gpg). Established North American Standards define softening as removing hardness down to <1 gpg, and many industries rely on these North American Standards. For instance, restricting the use of softeners at levels of hardness between 1 and 10 grains would void the warranty of many high efficiency water appliances, such as instantaneous heaters, shower heads, and dishwashers which are damaged by hardness scale. WEStand aims to promote water conservation through many avenues to include promoting the use of high efficiency water appliances which is supported by this proposal as amended.

Eric Yeggy:
I am in support of the proposal indicated above which includes the exception. Although this item failed to achieve the necessary 2/3 affirmative vote to pass, the amendment to the original proposal is justified because many private well owners rely on water softeners to remove health related contaminants such as radium and barium.
This can be seen through reviewing certification body listings like NSF’s linked here: https://info.nsf.org/Certified/DWTU/Listings.asp

The RESNET/ICC rating system penalizes the use of a water softener if a home’s hardness is under 10 gpg; consequently RESNET/ICC 850 discourages the use of water softeners in situations that would have unintended consequences to the health of private well owners.
Proposals

Item #: 134
WEStand 2023 Section: Table 1201.1

SUBMITTER: Nicholas Capezza
PHTA

RECOMMENDATION:
Revise text

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<td>APSP-14 2014-2019*</td>
<td>Portable Electric Spa Energy Efficiency</td>
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(portion of table not shown remains unchanged)

Note: APSP 14 meets the requirements for a mandatory reference standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revision reflects the latest update to the APSP standard that is referenced in Table 1201.1.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 28 NOT RETURNED: 2 CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand Section #: Table 1201.1

SUBMITTER: Karl Best
AHRI

RECOMMENDATION:
Accept as Modified
Request to accept the code change proposal as modified by this public comment.

**TABLE 1201.1**
**REFERENCED STANDARDS**

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<tr>
<td>AHRI 1160 (H-P)-2014 2022*</td>
<td>Performance Rating of Heat Pump Pool Heaters</td>
<td>Table 1105.2</td>
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(portion of table not shown remains unchanged)

Note: AHRI 1160 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revision reflects the latest update to AHRI 1160 that is referenced in Table 1201.1.

**PUBLIC COMMENT 2**

Code Year: 2023 WEStand  Section #: Table 1201.1  Item #: 134  Comment #: 2

SUBMITTER: Nicholas Capezza  PHTA

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

**TABLE 1201.1**
**REFERENCED STANDARDS**

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Note: PHTA 15 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revision updates APSP 15a to the new designation of PHTA 15. The above revision reflects the latest update to the PHTA standard that is referenced in Table 1201.1.
Proposals

Item #: 135
WESWand 2023  Section: Table 1201.1

SUBMITTER: Karl Aittaniemi
ICC

RECOMMENDATION:
Revise text

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<td>Landscape Irrigation Sprinkler and Emitter Standard</td>
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(portion of table not shown remains unchanged)

Note: ASABE/ICC 802 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revision reflects the latest update to the ICC standard that is referenced in Table 1201.1.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS:  AFFIRMATIVE: 28   NOT RETURNED: 2   CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023  WESWand  Section #: Table 1201.1  Item #: 135

SUBMITTER: Scott Cedarquist  ASABE

RECOMMENDATION:
Accept as Modified
Request to accept the code change proposal as modified by this public comment.

### TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI/ASABE S623.1-2017 (R2022)*</td>
<td>Determining Landscape Plant Water Demands</td>
<td>415.4.3</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

**Note:** ANSI/ASABE S623.1 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**SUBSTANTIATION:**
The above revision reflects the latest update to ANSI/ASABE S623.1 that is referenced in Table 1201.1.
Item #: 137

WEStand 2023  Section: Table 1201.1

SUBMITTER: Angel Guzman Rodriguez
ASME

RECOMMENDATION:
Revise text

### TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASME A112.14.6-2010 (R2015-R2019)*</td>
<td>FOG (Fats, Oils, and Greases) Disposal Systems</td>
<td>407.4.1</td>
</tr>
<tr>
<td>ASME A112.19.19-2016 (R2021)*</td>
<td>Vitreous China Nonwater Urinals</td>
<td>402.3.2</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: The ASME standards meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revisions reflect the latest updates to the ASME standards that are referenced in Table 1201.1.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: Table 1201.1

SUBMITTER: Angel Guzman Rodriguez/Steven Rossi
ASME

RECOMMENDATION:
Accept as Modified
Request to accept the code change proposal as modified by this public comment.

TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASME A112.19.3/CSA B45.4-2017-2022*</td>
<td>Stainless Steel Plumbing Fixtures</td>
<td>402.3.1</td>
</tr>
<tr>
<td>ASSE 1016/ASME A112.1016/ CSA B125.16-2017 (R2021)*</td>
<td>Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations</td>
<td>402.8</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: ASME A112.19.3/CSA B45.4 and ASSE 1016/ASME A112.1016/ CSA B125.16 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revisions reflect the latest updates to ASME A112.19.3/CSA B45.4 and ASSE 1016/ASME A112.1016/ CSA B125.16 that are referenced in Table 1201.1.

---

PUBLIC COMMENT 2

Code Year: 2023 WEStand  Section #: Table 1201.1  Item #: 137

SUBMITTER: Terry Burger  ASSE

RECOMMENDATION: Accept as Modified

Request to accept the code change proposal as modified by this public comment.

TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSE 1086-2022</td>
<td>Performance Specification Requirements for Reverse Osmosis Water Efficiency – Drinking Water</td>
<td>E 104.4.1</td>
</tr>
<tr>
<td>ASSE 1016/ASME A112.1016/ CSA B125.16-2017 (R2021)*</td>
<td>Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations</td>
<td>402.8</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: ASSE 1086 and ASSE 1016/ASME A112.1016/ CSA B125.16 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revisions reflect the latest updates to ASSE 1086 and ASSE 1016/ASME A112.1016/ CSA B125.16 that are referenced in Table 1201.1.
Proposals

Item #: 138
WEStand 2023  Section: Table 1201.1

SUBMITTER: Steve Mawn
ASTM

RECOMMENDATION:
Revise text

---

**TABLE 1201.1**

**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM F2831-2012 (R2017) 2019*</td>
<td>Standard Practice for Internal Non Structural Epoxy Barrier Coating of Material Used in Rehabilitation of Metallic Pressurized Piping Systems</td>
<td>303.2</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

**Note:** ASTM F2831 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**SUBSTANTIATION:**
The above revision reflects the latest update to the ASTM standard that is referenced in Table 1201.1.

**COMMITTEE ACTION:** ACCEPT AS SUBMITTED

**TOTAL ELIGIBLE TO VOTE:** 30

**VOTING RESULTS:**  AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

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**Appended Comments**

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**PUBLIC COMMENT 1**

**Code Year:** 2023 WEStand  **Section #:** Table 1201.1  **Item #:** 138

**SUBMITTER:** Steve Mawn  **ASTM**

**RECOMMENDATION:**
Accept as Modified
Request to accept the code change proposal as modified by this public comment.

### TABLE 1201.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM F2831-2019*</td>
<td>Standard Practice for Internal Non Structural Epoxy Barrier Coating of Material Used in Rehabilitation of Metallic Pressurized Piping Systems</td>
<td>303.2</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

**Note:** ASTM F2831 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**SUBSTANTIATION:**
The above revision reflects the latest update to ASTM F2831 that is referenced in Table 1201.1.

---

**PUBLIC COMMENT 2**

**Code Year:** 2023 WESstand  **Section #:** Table 1201.1  **Item #:** 138  **Comment #:** 2  **SUBMITTER:** Paul Olson  **AWWA**

**RECOMMENDATION:**
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

### TABLE 1201.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWWA C655-2009 2018*</td>
<td>Field Dechlorination</td>
<td>E 104.4.3</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

**Note:** AWWA C655 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**SUBSTANTIATION:**
The above revision reflects the latest update to AWWA C655 that is referenced in Table 1201.1.
Proposals

Item #: 139
WEStand 2023  Section: Table 1201.1

SUBMITTER: Lauro Pilla / Nikki Kidd
CSA

RECOMMENDATION:
Revise text

TABLE 1201.1
REFERENCED STANDARDS

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<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSA/ANSI Z21.10.3-2017 2019/CSA 4.3-2019*</td>
<td>Gas-Fired Water Heaters, Volume III, Storage Water Heaters With Input Ratings Above 75,000 BTU per Hour, eCirculating and Instantaneous (same as CSA 4.3)</td>
<td>Table 1005.2</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: CSA/ANSI Z21.10.3/CSA 4.3 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revision reflects the latest update to the CSA standard that is referenced in Table 1201.1.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: Table 1201.1  Item #: 139
SUBMITTER: Lauro Pilla / Nikki Kidd  CSA  Comment #: 1
RECOMMENDATION: Accept as Modified
Request to accept the code change proposal as modified by this public comment.

### TABLE 1201.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSA B45.5/IAPMO Z124-2017</td>
<td><strong>Standard for Plastic Plumbing Fixtures</strong></td>
<td>402.3, 402.3.1</td>
</tr>
<tr>
<td>ASSE 1016/ASME A112.1016/ CSA B125.16-2017 (R2021)*</td>
<td>Performance Requirements for Automatic Compensating Valves for Individual Showers and Tub/Shower Combinations</td>
<td>402.8</td>
</tr>
<tr>
<td>ASME A112.19.3/CSA B45.4-2017*</td>
<td>Stainless Steel Plumbing Fixtures</td>
<td>402.3.1</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

**Note:** CSA B45.5/IAPMO Z124, ASSE 1016/ASME A112.1016/ CSA B125.16, and ASME A112.19.3/CSA B45.4 meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

**SUBSTANTIATION:**
The above revisions reflect the latest updates to the CSA standards that are referenced in Table 1201.1.
Proposals

Item #: 141
WEStand 2023  Section: Table 1201.1

SUBMITTER: Terry Burger
IAPMO

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 115-2013</td>
<td>Automatic Water Leak Detection and Control Devices</td>
<td>409.4</td>
</tr>
<tr>
<td>IAPMO IGC 207-2009a</td>
<td>Reclaimed Water Conservation System for Flushing Toilets</td>
<td>604.7</td>
</tr>
<tr>
<td>IAPMO IGC 324-2016a</td>
<td>Alternate Water Source Systems for Single-Family Dwellings Multi-Family, Residential, and Commercial Use</td>
<td>Table 702.9(2), Table 802.9(2)</td>
</tr>
<tr>
<td>ANSI/CAN/IAPMO IGC 349 Z1349-2018-2021*</td>
<td>Electronic Plumbing Supply System Integrity Protection Devices for Detection, Monitoring or Control of Plumbing Systems</td>
<td>409.1</td>
</tr>
<tr>
<td>IAPMO PS 76-2012a-2021</td>
<td>Trap Primers for Fill Valves and Flushometer Valves</td>
<td>416.1</td>
</tr>
<tr>
<td>IAPMO/ANSI UMC 1 2018-2021*</td>
<td>Uniform Mechanical Code</td>
<td>101.6.3</td>
</tr>
<tr>
<td>IAPMO/ANSI UPC 1 2018-2021*</td>
<td>Uniform Plumbing Code</td>
<td>103.6.4</td>
</tr>
<tr>
<td>IAPMO/ANSI USPHSHTC 1 2018-2021*</td>
<td>Uniform Swimming Pool, Spa, and Hot Tub Code</td>
<td>101.6.6</td>
</tr>
</tbody>
</table>

Note: The IAPMO standards meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO's Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revisions reflect the latest updates to the IAPMO standards that are referenced in Table 1201.1. ANSI/CAN/IAPMO Z1349 supersedes IAPMO IGC 115 and IAPMO IGC 349. Table 1201.1 has been modified to reflect this update.

COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC
TABLE 1201.1
REFERENCED STANDARDS

<table>
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<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 115-2013*</td>
<td>Automatic Water Leak Detection and Control Devices</td>
<td>409.1</td>
</tr>
<tr>
<td>IAPMO IGC 324-2019</td>
<td>Alternate Water Source Systems for Multi-Family, Residential, and Commercial Use</td>
<td>Table 702.9(2), Table 802.9(2)</td>
</tr>
<tr>
<td>IAPMO IGC 349-2018*</td>
<td>Electronic Plumbing Supply System Integrity Protection Devices</td>
<td>409.1</td>
</tr>
<tr>
<td>ANSI/CAN/IAPMO Z1349-2021*</td>
<td>Devices for Detection, Monitoring or Control of Plumbing Systems</td>
<td>409.1</td>
</tr>
<tr>
<td>IAPMO/ANSI UMC 1-2021*</td>
<td>Uniform Mechanical Code</td>
<td>101.6.3</td>
</tr>
<tr>
<td>IAPMO/ANSI UPC 1-2021*</td>
<td>Uniform Plumbing Code</td>
<td>103.6.4</td>
</tr>
<tr>
<td>IAPMO/ANSI USHGC 1 2021*</td>
<td>Uniform Solar, Hydronics and Geothermal Code</td>
<td>101.6.5</td>
</tr>
<tr>
<td>IAPMO/ANSI USPSHTC 1-2021*</td>
<td>Uniform Swimming Pool, Spa, and Hot Tub Code</td>
<td>101.6.6</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

COMMITTEE STATEMENT:
Item #141 is being amended to keep reference to IAPMO IGC 115, IAPMO IGC 349, and ANSI/CAN/IAPMO Z1349. This change is in support of the actions taken by the Technical Committee on Item #055.

TOTAL ELIGIBLE TO VOTE: 30
VOTING RESULTS: AFFIRMATIVE: 28 NOT RETURNED: 2 CRAWFORD, WILLIAMS

Appended Comments

PUBLIC COMMENT 1

Code Year: 2023 WEStand Section #: Table 1201.1 Item #: 141
SUBMITTER: Terry Burger IAPMO

RECOMMENDATION: Accept as Modified

Request to accept the code change proposal as modified by this public comment.

TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 244-2021</td>
<td>Industry Standard for Tub and Shower Flow-Reduction Systems</td>
<td>402.10</td>
</tr>
<tr>
<td>ANSI/CAN/IAPMO Z1349-2021*</td>
<td>Standard for Devices for Detection, Monitoring or Control of Plumbing Systems</td>
<td>409.1</td>
</tr>
<tr>
<td>IAPMO/ANSI UMC 1-2024*</td>
<td>Uniform Mechanical Code</td>
<td>101.6.3</td>
</tr>
<tr>
<td>IAPMO/ANSI UPC 1-2024*</td>
<td>Uniform Plumbing Code</td>
<td>103.6.4</td>
</tr>
<tr>
<td>IAPMO PS 76-2021</td>
<td>Industry Standard for Trap Primers for Fill Valves and Flushometer Valves</td>
<td>416.1</td>
</tr>
<tr>
<td>CSA B45.5/IAPMO Z124-2022*</td>
<td>Standard for Plastic Plumbing Fixtures</td>
<td>402.3, 402.3.1</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)
Note: The IAPMO standards meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revisions reflect the latest updates to the IAPMO standards that are referenced in Table 1201.1.

PUBLIC COMMENT 2

Code Year: 2023 WEStand  Section #: Table 1201.1  
Item #: 141

SUBMITTER: Alex Ing  
NFPA

Comment #: 2

RECOMMENDATION: Accept as Modified

Request to accept the code change proposal as modified by this public comment.

TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
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</thead>
<tbody>
<tr>
<td>NFPA 70·2023·2023</td>
<td>National Electrical Code</td>
<td>F 301.5.1</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: NFPA 70 meets the requirements for a mandatory referenced standard in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revision reflects the latest update to NFPA 70 that is referenced in Table 1201.1.
Proposals

Item #: 142

WEStand 2023  Section: Table 1201.1

SUBMITTER: Jeremy Brown
NSF

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>STANDARD NUMBER-YEAR</th>
<th>STANDARD TITLE</th>
<th>REFERENCED SECTION</th>
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<tbody>
<tr>
<td>NSF ANSI 14-2018-2020*</td>
<td>Plastics Piping System Components and Related Materials</td>
<td>302.1.1</td>
</tr>
<tr>
<td>NSF ANSI 41-2018*</td>
<td>Non-Liquid Saturated Treatment Systems</td>
<td>502.1.1</td>
</tr>
<tr>
<td>NSF ANSI 44-2018*</td>
<td>Residential Cation Exchange Water Softeners</td>
<td>406.1</td>
</tr>
<tr>
<td>NSF ANSI 53-2018-2020*</td>
<td>Drinking Water Treatment Units – Health Effects</td>
<td>A 104.3.1</td>
</tr>
<tr>
<td>NSF ANSI CAN 61-2018 2021*</td>
<td>Drinking Water Systems Components - Health Effects</td>
<td>A 103.2, A 104.5.1</td>
</tr>
<tr>
<td>NSF P151-2014-2021</td>
<td>Health Effects from Rainwater Catchment System Components</td>
<td>A 103.1, A 103.2</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

Note: The NSF standards meet the requirements for mandatory referenced standards in accordance with Section 15.0 of IAPMO’s Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

SUBSTANTIATION:
The above revisions reflect the latest updates to the NSF standards that are referenced in Table 1201.1.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 30

VOTING RESULTS: AFFIRMATIVE: 28  NOT RETURNED: 2  CRAWFORD, WILLIAMS

Appended Comments
PUBLIC COMMENT 1

Code Year: 2023 WEStand  Section #: Table 1201.1  Item #: 142
SUBMITTER: Jeremy Brown  NSF  Comment #: 1

RECOMMENDATION:
Accept as Modified

Request to accept the code change proposal as modified by this public comment.

TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF/ANSI 14-2022</td>
<td>Plastics Piping System Components and Related Materials</td>
<td>302.1.1</td>
</tr>
<tr>
<td>NSF/ANSI 44-2021*</td>
<td>Residential Cation Exchange Water Softeners</td>
<td>406.1</td>
</tr>
<tr>
<td>NSF/ANSI 53-2022*</td>
<td>Drinking Water Treatment Units – Health Effects</td>
<td>A 104.3.1</td>
</tr>
<tr>
<td>NSF/ANSI 55-2021*</td>
<td>Ultraviolet Microbiological Water Treatment Systems</td>
<td>E 104.4.1</td>
</tr>
<tr>
<td>NSF/ANSI 58-2022*</td>
<td>Reverse Osmosis Drinking Water Treatment Systems</td>
<td>406.3, E 104.4.4.1</td>
</tr>
<tr>
<td>NSF/ANSI/CAN 61-2022*</td>
<td>Drinking Water Systems Components - Health Effects</td>
<td>A 103.2, A 104.5.1</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

SUBSTANTIATION:
The above revisions reflect the latest updates to the NSF standards that are referenced in Table 1201.1.
Task Group Reports
During the Water Efficiency and Sanitation Standard Technical Committee (WE•Stand TC) Meeting on June 22, 2022 to June 23, 2022, the WE•Stand TC requested that the Direct Potable Water Reuse Task Group reconvene to review their respective proposals and generate public comments for Technical Committee consideration. The WE•Stand TC also requested that the Direct Potable Water Reuse Task Group be expanded to include additional expertise for evaluation and consensus on risk assessment and safety parameters.

A press release was distributed to the industry seeking applicants to serve as technical experts on the WE•Stand Direct Potable Water Reuse Task Group resulting in the addition of eight new members. This larger group of technical experts then conducted four meetings to review Item #124 through Item #128, consisting of Appendix E (Onsite Wastewater Treatment for Direct Potable Water Reuse), as published in the 2022 WEStand Report on Proposals.

Based on the concerns expressed by the TC via comments received on these items during balloting, the Task Group began their review focusing on the applicability of Appendix E. After lengthy discussion covering the duration of the first meeting, the Task Group determined that treatment systems covered under this appendix are specifically intended for use in “dwelling units.” To offer additional clarity, terminology for “dwelling unit” was also generated. This distinction is pertinent as it addresses the potential issues associated with multiple households utilizing a single direct potable use system. The Task Group also revised the title of Appendix E to “Onsite Wastewater Treatment for Direct Potable Water Use” and requested to update the name of Task Group to correlate with this change.

The Task Group then examined Section E 103.0 (System Requirements) and determined that language needed to be included which addressed competency of system designers as well as needed considerations for potential non-regulated contaminants. Due to the toxicity of chemotherapy pharmaceuticals and the inability of the treatment system to remove such contaminants, language has been included to prohibit the use of the treatment system in cases where any household member is undergoing chemotherapy. Also updated under system requirements were provisions for storage tanks containing treated water including rodentproofing and reference NSF/ANSI/CAN 61.
Following the updates to system requirements, the Task Group focused on Section E 104.0 (System Design) and analyzed each stage of the treatment system. From this analysis, treatment methods were reorganized, and two additional stages were introduced to cover tertiary treatment and storage after treatment. Based on these revisions, Figure E 104.1 (Onsite Wastewater Treatment Stages for Direct Potable Use) was updated for correlation and new informative notes were provided for nanofiltration, control systems, carbon filtration, and storage after treatment. For technical accuracy and alignment with the intent of this appendix, terminology used to describe these treatment methods was then discussed, reviewed, and modified.

The next major focus of the Task Group involved the review of industry standards, their appropriateness based on scope, and their correct reference in relation to the use of such devices within specified treatment stages. For example, both UV sterilization and reverse osmosis have been relocated under Section E 104.5 (Tertiary Treatment). At this point within the treatment system, the collected water has already gone through solid separation, biological disinfection, sanitization, and various levels of filtration which are sufficient to ensure that visually clear water is introduced into this part of the treatment chain. The tertiary treatment stage then offers additional sterilization or filtration to further purify the treated water.

Lastly, the Task Group expanded minimum water quality requirements at the point of use (POU) of the onsite wastewater treatment system to also include reference to ARCSA/ASPE/ANSI 63. From this discussion, it was then deemed appropriate to also submit two public comments addressing items relating to the reference of this standard. These recommendations are for both consistency within the WEStand and alignment with the scope of ARCSA/ASPE/ANSI 63.

Upon completion of the Task Group’s meetings, 6 public comments were generated and submitted to the WE•Stand TC for consideration during the May 17, 2023 to May 18, 2023 WE•Stand Technical Committee Meeting.

SECTION #: 902.1, Table 1201.1

RECOMMENDATION:

Request to replace the code change proposal by this public comment.

902.0 Nonpotable Rainwater Catchment Systems.

902.1 General. The provisions of this section shall apply to the installation, construction, alteration, and repair of rainwater catchments systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, irrigation, industrial processes, water features, cooling tower makeup and other uses approved by the Authority Having Jurisdiction. Additional design criteria can be found in the ARCSA/ASPE 63 Standard.

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCSA/ASPE/ANSI</td>
<td>Rainwater Catchment Systems</td>
<td>902.1, A 104.9.1</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)
SUBSTANTIATION:
Section 902.1 (General) is being revised to remove informative language from the mandatory body of the standard. Additionally, Table 1201.1 (Referenced Standards) has been updated to include the latest edition of ARCSA/ASPE/ANSI 63.

SECTION #: Table 1201.1, A 101.7, A 104.9.1

RECOMMENDATION:
Request to accept the code change proposal as modified by this public comment.

A 101.0 General.

A 101.7 Minimum Water Quality Requirements. The minimum water quality for all potable rainwater catchment systems shall be in accordance with ARCSA/ASPE/ANSI 63 or shall meet the applicable water quality requirements as determined by the Authority Having Jurisdiction for private wells.

A 104.0 Design and Installation.

A 104.9 Roof Washer or Pre-Filtration System. (remaining text unchanged)
A 104.9.1 Size. The roof washer shall be sized to direct a sufficient volume of rainwater containing debris that has accumulated on the collection surface away from the storage tank.
Note: See The ARCSA/ASPE/ANSI 63 Standard contains for additional guidance on acceptable methods of sizing roof washers.

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCSA/ASPE/ANSI 63-20132020*</td>
<td>Rainwater Catchment Systems</td>
<td>902.1, A 101.7, A 104.9.1</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

SUBSTANTIATION:
Reference has been made to ARCSA/ASPE/ANSI 63 (Rainwater Catchment Systems) as this standard establishes the minimum potable water quality parameters required at the point of use (POU) for harvested rainwater which are consistent with the potable water standards established by the U.S. EPA for drinking water.

Additionally, the parameters dictated by ARCSA/ASPE/ANSI 63 are consistent with those found in Table A 104.2.3 (Minimum System Maintenance Requirements) and therefore presents no conflict if referenced in Section A 101.7 (Minimum Water Quality Requirements).

The revision to Section A 104.9.1 (Size) is necessary to meet IAPMO's Manual of Style. This modification identifies informative language as a “note” to the section and more appropriately directs users of the WEStand to ARCSA/ASPE/ANSI 63 for additional guidance on acceptable methods of sizing roof washers.
SECTION #: Table 1201.1, E 101.1, E 101.6, E 102.0

RECOMMENDATION:

Request to accept the code change proposal as modified by this public comment.

APPENDIX E
ONSITE WASTEWATER TREATMENT FOR DIRECT POTABLE WATER REUSE

E 101.0 General.
E 101.1 Applicability. The provisions of this appendix shall apply to the design and installation of onsite wastewater treatment systems for direct potable water reuse in one- and two-unit family dwellings and townhouses dwelling units.

E 101.6 Minimum Water Quality Requirements. The minimum output water quality at the point of use (POU) of an onsite wastewater treatment system shall comply with Table A 104.2.3, ARCSA/ASPE/ANSI 63, and meet the potable water quality requirements specified by the Authority Having Jurisdiction, or in absence, shall meet the potable water requirements of the adopted direct potable water reuse standards, or in absence, shall comply with the water quality requirements specified by the Authority Having Jurisdiction.

E 102.0 Definitions.
Dwelling Unit. A single residential unit which provides independent water utility for one or more persons of the same family or household.

TABLE 1201.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCSA/ASPE/ANSI 63-20132020*</td>
<td>Rainwater Catchment Systems</td>
<td>902.1, A 104.9.1, E 101.6</td>
</tr>
</tbody>
</table>

(portion of table not shown remains unchanged)

(shown for information purposes only)

TABLE A 104.2.3
MINIMUM SYSTEM MAINTENANCE REQUIREMENTS

<table>
<thead>
<tr>
<th></th>
<th>Non-detectable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coliform</td>
<td></td>
</tr>
<tr>
<td>Escherichia coli (fecal coliform)</td>
<td>Non-detectable</td>
</tr>
<tr>
<td>Turbidity</td>
<td>&lt;0.3 NTU</td>
</tr>
</tbody>
</table>

SUBSTANTIATION:
Section E 101.1 (Applicability) is being updated to clarify that direct potable use systems covered by this appendix are to be used only for dwelling units, and the provided definition for “dwelling unit” clearly addresses the potential issues associated with multiple households utilizing a single direct potable use system. The applicability solely pertains to direct potable use systems utilized by the same family or household within a single residential unit that has independent water utility.
Section E 101.6 (Minimum Water Quality Requirements) is being revised to clarify that the water quality at the point of use (POU) must meet acceptable parameters for potable water applications. Reference has been made to ARCSA/ASPE/ANSI 63 (Rainwater Catchment Systems) as this standard establishes the minimum potable water quality parameters required at POU for harvested rainwater. These parameters are consistent with the potable water standards established by the U.S. EPA for drinking water. Since Table A 104.2.3 (Minimum System Maintenance Requirements) aligns with these values, reference to this table has also been included.

It should be noted that this section requires compliance with Table A 104.2.3, ARCSA/ASPE 63, and the potable water quality requirements specified by the Authority Having Jurisdiction. The use of Table A 104.2.3 and ARCSA/ASPE 63 are not intended to supersede the potable water quality requirements specified by the Authority Having Jurisdiction. All three are complimentary of one another. In any case, the most stringent potable water quality requirements will apply to these system outputs at the POU.

As established in Section 102.1 (Conflicts), previously Section 101.7 in the 2020 WEStand:
“Where, in any specific case, different sections of this standard or referenced standards specify different materials, methods of construction, or other requirements, the most restrictive shall govern as determined by the Authority Having Jurisdiction. When there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable.”

SECTION #: E 102.1

RECOMMENDATION:

Request to accept the code change proposal as modified by this public comment.

E 102.0 Definitions.

E 102.1 General. For purposes of this appendix, the following definitions shall apply:

- **Aerobic Bioreactor.** A device that uses oxygen to create a biologically active matrix for the purpose of breaking down organic matter.
- **Chemical Disinfection.** Sterilization using a chemical reaction or oxidation to either kill or inhibit the RNA to DNA transcription, rendering pathogens harmless.
- **Chlorination.** Sterilization A disinfection process using chlorine to either kill or inhibit the RNA to DNA transcription, rendering pathogens harmless.
- **Direct Potable Water Reuse (DPR).** Multiple phases of advanced water purification to transform treated wastewater into a safe, reliable drinking water supply.
- **Heat Sterilization.** An act of destroying all forms of life on and in bacteriological media, foods, hospital supplies, and other materials by means of moist or dry heat.
- **Nanofiltration.** A water filtration process utilizing a thin-film membrane operating under low pressure to remove particles smaller than 10 nanometers (nm).
- **Polishing.** A finishing treatment method used to maintain water quality levels after water leaves the treatment and processing stages.
- **Raw Water.** Influent water collected from the dwelling unit and supplied to the direct potable water use treatment system. Also known as wastewater.

SUBSTANTIATION:
Terminology is being added for “aerobic bioreactor,” “nanofiltration,” “polishing,” and “raw water” to support the other revisions proposed by this Task Group.
Aerobic bioreactors are used in wastewater treatment systems to break down organic contaminants and other pollutants by means of oxygen diffusion. Oxygen serves as the terminal electron acceptor and is able to sustain a large number of important reactions that use a number of different electron donors. The provided definition offers a simplified description for aerobic reactor that is sufficient for the purposes of this appendix.

“Polishing” is now included in the new notes supporting Figure E 104.1 (Onsite Wastewater Treatment Stages for Direct Potable Use) and appropriate terminology for this term offers additional clarity when interpreting this informative language.

Furthermore, the term “sanitization” is more appropriate than “sterilization” for the purposes of this appendix and has been revised throughout for technical accuracy. The only appropriate use of the term sterilization is “UV sterilization” which has not been revised within this appendix. While sterilization removes all microorganisms, sanitization reduces microorganisms to a safe level. Following this intent, the definition of “chlorination” has been revised, and the definition of “heat sterilization” has been deleted. Figure E 104.1 has also been revised in Item #127 Public Comment 01 to reflect these updates.

SECTION #: E 103.1 - E 103.8

RECOMMENDATION:

Request to accept the code change proposal as modified by this public comment.

E 103.0 System Requirements.

E 103.1 General. Direct potable use systems shall be designed in accordance with this appendix by a registered design professional, or a person who demonstrates competency to design direct potable use systems as required by the Authority Having Jurisdiction. Where deemed necessary by the registered design professional, considerations shall be made for non-regulated contaminants, including but not limited to, heavy metals, cleaning agents, and hormones. Chemotherapy pharmaceuticals shall not enter the direct potable water use system.

E 103.1.1 E 103.2.1 Cross-Contamination. No person shall make a connection or allow one to exist between pipes or conduits carrying domestic water supplied by a public or private building supply system, and pipes, conduits, or fixtures containing or carrying water from any other source or containing or carrying water that has been used for any purpose whatsoever, or piping carrying chemicals, liquids, gases, or substances whatsoever, unless there is provided a backflow prevention device approved for the potential hazard and maintained in accordance with the plumbing code. Each point of use shall be separately protected where potential cross-contamination of individual units exists.

E 103.1.2 E 103.2.2 Cross-Connection Inspection and Testing. A cross-connection test is required in accordance with Section 601.11.2. 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.

E 103.2 E 103.3 Overflow. Raw water overflow shall be connected directly to the plumbing drainage system. The overflow piping 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.
E 103.4 **Treated Water.** Treated water shall be connected directly to an aerated storage tank capable of maintaining water quality in accordance with Section E 101.6. Storage tanks shall be protected from light intrusion. Storage tanks, liners, and coatings shall be listed to NSF/ANSI/CAN 61. Tank openings shall be protected to prevent the entrance of insects, birds, or rodents. Storage capacity shall be determined based on the estimated daily volume of wastewater and usage of potable water.

E 103.4 **Diverter Valves.** The onsite wastewater treatment system shall connect to the sanitary drainage system through a diverter valve(s) approved by the Authority Having Jurisdiction. At a minimum, a diverter valve shall be installed between the main drain line and the onsite treatment system. Additional diverter valves shall be permitted to be installed at other locations as specified by the registered design professional and the Authority Having Jurisdiction. Where toxins and contaminants are detected in accordance with Section E 103.7, raw water shall be diverted to the sewage system, and the diverter valve shall be reset only once safe operating conditions are met.

E 103.5 **Isolation Valves.** A means of isolation shall be provided between the treatment system and the plumbing system. Automatic shut-off shall be provided in accordance with Section E 103.6.

E 103.7 **Monitoring and Controls.** Onsite wastewater treatment systems shall be provided with a means of continuous monitoring of the treatment stages and shall be provided with a means of automatic shut-off when a malfunction occurs or when measured parameters are outside of the acceptable ranges specified by the Authority Having Jurisdiction. In the event of a malfunction, raw water shall be diverted to the sewage system, and the diverter valve shall be reset only once safe operating conditions are met.

Notes:
(1) Biological and pathogen parameters may only be measured by a qualified testing laboratory. Such testing requires multi-day turnaround for results. To control a system in real-time and react to water quality and flow fluctuations, reliable online measurement technology should be deployed.
(2) The following types of sensors are available in the industry and provide reliable outputs:
(a) Flow rate
(b) Pressure
(c) Solid content
(d) Oxidation-reduction potential (ORP)
(e) Temperature
(f) pH
(g) Dissolved oxygen
(h) Turbidity
(i) Total Suspended Solids
(j) Conductivity
(k) Gas

E 103.8 **Validation.** Where required by the Authority Having Jurisdiction, treatment processes shall be tested to verify the pathogen reduction performance. The treatment processes shall be validated through third-party component validation or field verification using challenge testing. The results of the third-party component validation and/or challenge testing 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.

(Shown for information purposes only)

220.0 - R -

**Registered Design Professional.** An individual who is registered or licensed by the laws of the state to perform such design work in the jurisdiction.
SUBSTANTIATION:
Section E 103.1 (General) is being added to ensure that wastewater treatment systems are designed by registered design professionals. Language has also been included to address non-regulated contaminants such as heavy metals, cleaning agents, and hormones. While there currently exists no established acceptable parameters for hormone levels in potable water, the registered design professional is responsible for establishing remediation actions if there are potential negative effects on the treatment system. As these considerations vary dependent on residents within the dwelling unit, it is pertinent that such design specifications are determined on a case-by-case basis. However, in any case, treatment systems are not permitted to be used where any resident(s) are undergoing chemotherapy treatment.

Section E 103.4 (Treated Water) is being modified to include provisions for storage tanks containing treated water. The most appropriate standard for reference in this section is NSF/ANSI/CAN 61 (Drinking Water System Components – Health Effects). As stated within the scope and purpose of NSF/ANSI/CAN 61, “This standard establishes minimum health effects and requirements for the chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems. This standard is intended to cover specific materials or products that come into contact with drinking water, drinking water treatment chemicals, or both.”

Section E 103.5 (Diverter Valves) is being revised to include language which addresses situations where toxins and contaminants are detected at any point in the system. If the system controllers detect an unsafe condition or an error, it can no longer safely process water. In such a case, the raw incoming water must be diverted into the sanitary sewer or safely disposed of as required by the Authority Having Jurisdiction. A dedicated diverted valve is required for such an operation. The system may only start processing again once all errors have been cleared and safe operation has been confirmed. This may require a service call or site visit by an authorized technician. However, such provisions are necessary for healthy and safety of the end users.

SECTION #: E 104.0 - E 104.5.2

RECOMMENDATION:

Request to accept the code change proposal as modified by this public comment.

E 104.0 System Design.
E 104.1 General. Onsite wastewater treatment systems shall be designed in accordance with this appendix and installed by a registered design professional. Onsite wastewater treatment systems covered by this appendix shall include the following treatment stages:
Stage 1: Solid separation in accordance with Section E 104.2.
Stage 2: Primary treatment in accordance with Section E 104.3.
Stage 3: Secondary treatment in accordance with Section E 104.4.
Stage 4: Tertiary treatment in accordance with Section E 104.5.
Stage 5: Storage after treatment in accordance with Section E 103.4.
Stage 46: Electrolyte addition, carbon filtration, and remineralization.
(See Figure E 104.1 for a flow diagram of treatment methods and stages utilized in DPR direct potable use systems.)

Note:
(1) To eliminate a single point of failure in the sterilization sanitation stage, an additional method of filtration is recommended between Stage 3 and Stage 4. The recommended level of filtration is 0.05 micron (0.05 µm).
(2) Where approved by the registered design professional, storage may be provided after any treatment stage.
FIGURE E 104.1
ONSITE WASTEWATER TREATMENT STAGES FOR DPR DIRECT POTABLE USE1,2,3,4

Notes:
1 Nanofiltration may be utilized in either the secondary or tertiary treatment stages, or both, dependent upon the desired level of water quality. Repetitive use of nanofiltration adds reliability to the treatment system and reduces system malfunction.
2 The control system may be utilized to monitor the storage tank and initiate polishing by means of recirculating the treated water back through the primary, secondary, and tertiary treatment stages. Storage tank monitoring methods may include, but are not limited to, conductivity sensors, flow meters measuring depletion volumes, timers to initiate automatic turnover, and water temperature sensors.
3 Carbon filtration may be utilized as a means of taste enhancement for stored treated water.
4 Where approved by the registered design professional, storage may be provided after any treatment stage.
E 104.2 Solid Separation. Collected wastewater shall pass through a filter screen of not less than 18 mesh (1 mm) prior to primary treatment. Separated solids and organic matter from the wastewater shall be diverted to a treatment chamber. Wastewater shall be diverted to a designated basin or storage tank.

E 104.3 Primary Treatment. Separated solids and organic matter shall undergo heat sterilization, sanitization, or chemical disinfection prior to removal. Primary treatment for wastewater shall be completed by one or more of the following means:
1. Biological treatment,
2. Flocculation,
3. Coagulation, or
4. Membrane filtration, or
5. Other equivalent method of treatment as approved by the Authority Having Jurisdiction.

Minimum standards for the biochemical oxygen demand (BOD), total suspended solids (TSS), and pH limitations shall be in accordance with the Authority Having Jurisdiction.

E 104.4 Secondary Treatment. Secondary treatment for wastewater shall be in accordance with this section, and Section E 104.4.1 through Section E 104.4.1 E 104.4.3. Treatment shall be completed by one or more of the following means:
1. Ultraviolet sterilization,
2. Chemical disinfection,
3. Electrolysis, or
4. Aerobic reactors,
5. Nanofiltration,
6. Other equivalent method of treatment as approved by the Authority Having Jurisdiction.

E 104.4.1 Ozone. Design, installation, and commissioning of ozone systems shall comply with AWWA F120. Ozone systems shall be equipped with an airflow switch monitored by a controller as well as an oxidation reduction potential (ORP) sensor. The ORP reading of water shall not be less than 500 mV near the exit point of the system.

E 104.4.2 Chlorination/Dechlorination. In systems where chlorine is used for secondary treatment, the chlorine dosage shall be determined by the total chlorine level required for disinfection, and a means of dechlorination shall be provided to meet the potable water quality parameters for free chlorine as approved by the Authority Having Jurisdiction. Plans and procedures for dechlorination shall be in accordance with AWWA C655. Chlorine disinfection systems shall be equipped with ORP sensors, or equivalent, to determine the concentration of free available chlorine.

E 104.4.3 Filtration. The level of filtration shall be selected in accordance with the water quality requirements of Section E 101.6.

E 104.5 Tertiary Treatment. Tertiary treatment for wastewater shall be in accordance with this section, Section E 104.5.1, and Section E 104.5.2. Treatment shall be completed by one or more of the following means:
1. Nanofiltration,
2. Reverse Osmosis (RO),
3. Ultraviolet (UV) sterilization, or
4. Other equivalent method of treatment as approved by the Authority Having Jurisdiction.

E 104.4.1 UV Sterilization. Where utilized, ultraviolet microbiological treatment systems shall be in accordance with NSF/ANSI 55, Class A systems. A minimum of 2 inline filters, one 5 micron (5 µm) filter followed by one 0.5-1 micron (0.5-1µm) filter, shall be installed prior to the UV disinfection system.

E 104.4.2 Reverse Osmosis (RO). Where installed, reverse osmosis water treatment systems shall be listed in accordance with NSF/ANSI 58 and ASSE 1086, or other equivalent standards, and shall be installed and maintained in accordance with the manufacturer’s specifications.

Exception: Where approved by the registered design professional, the waste stream on the RO system shall be rerouted back into the water treatment system, and compliance with ASSE 1086 shall not be required.
Reverse osmosis water treatment systems shall be equipped with automatic shutoff valves to prevent discharge when there is no call for producing treated water. RO systems shall be selected and sized based on the following conditions:

1. Estimated volume of water to be disinfected (gal/day) (L/day).
2. Not less than a 20 percent variation in volume (gal) (L).
3. Lowest expected water temperature (°F) (°C).

**SUBSTANTIATION:**
Section E 104.0 (System Design), including Figure E 104.1 (Onsite Wastewater Treatment Stages for Direct Potable Use), has been updated to include additional treatment stages within the direct potable use system. This was done to ensure that treatment provisions and referenced standards align with their applicability and scope.

For example, both UV sterilization and reverse osmosis have been relocated under Section E 104.5 (Tertiary Treatment). At this point within the treatment system, the collected water has already gone through solid separation, biological disinfection, sanitization, and various levels of filtration which are sufficient to ensure that visually clear water is introduced into this part of the treatment chain. The tertiary treatment stage then offers additional sterilization or filtration to further purify the treated water.

It should be noted that the intent of Section E 104.0 is to convey a system design objective versus product or design restrictive terminology. The objective of the requirements is for the system to have an acceptable output water quality and at the same time allow for flexibility and variation in design.

With respect to the standards in question that are referenced for product compliance (i.e., NSF/ANSI 55, NSF/ANSI 58 and ASSE 1086). The inclusion of these requirements in the text of this proposal is to both allow multiple options for the system designers and to limit the actual products used to those which have been certified.

Figure E 104.1 now includes additional stages in the treatment system to cover tertiary treatment and storage of treated water. The flow diagram incorporates all modifications made in-text and offers new informative language regarding control systems, nanofiltration, and carbon filtration. Such language offers needed clarity for the registered design professional and is beneficial when interpreting the flow diagram.
Premise Water Supply System Design Task Group Report
During the Water Efficiency and Sanitation Standard Technical Committee (WE•Stand TC) Meeting on June 22, 2022 to June 23, 2022, the WE•Stand TC requested that the Premise Water Supply System Design Task Group reconvene to review their respective proposals and generate public comments for Technical Committee consideration. Following the WE•Stand TC Meeting, the Task Group conducted two meetings to complete this goal.

The scope of the Premise Water Supply System Design Task Group, as approved by the WE•Stand TC, was 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 included minimizing pipe sizes and lengths, strategically locating fixtures and appliances near each other and to the water heater, piping strategies to prevent or minimize stagnation, velocity minimums and maximums for water quality control, and technologies for leak detection devices.

Based on the committee statements provided for Item #074 and Item #123, the Task Group relocated the sizing charts originally proposed within revised Appendix C (Peak Water Demand Calculator – Examples) to new Chapter 5 (Peak Water Demand Calculator). Section 503.3 (Determining Pipe Diameters) was determined to be the most appropriate location for referencing these charts as this section addresses the use of permissible friction loss and demand loads in conjunction with the provided sizing charts to determine pipe diameters. The Task Group agrees that this relocation is beneficial as it offers applicable tools and provides additional guidance when implementing the Water Demand Calculator (WDC).

The Task Group then reviewed Item #113, their proposal addressing maximum hot water system ratios for low-rise residential applications. The primary focus was to identify potential areas of concern or confusion and provide revisions for needed clarity and interpretation of provisions. From this discussion, it was clear that confusion revolved around the determination of hot water system rectangles and how fixtures on multiple floors are accounted for in relation to the maximum hot water system ratio of 60 percent. In order to prevent misinterpretations, the language was revised to specify that the ratio is calculated via the hot water system rectangle and the “dwelling footprint” rather than the “floor area.” Additionally, language was removed which mentioned multiple stories within a dwelling as the 60 percent area is only accounted for once and does not tally for each additional floor of the unit. Terminology for “dwelling footprint” was then generated to support this modification.

Upon completion of the Task Group’s meetings, 3 public comments were generated and submitted to the WE•Stand TC for consideration during the May 17, 2023 to May 18, 2023 WE•Stand Technical Committee Meeting.
SECTION #: Chapter 5, Appendix C

RECOMMENDATION:

Request to replace the code change proposal by this public comment.

CHAPTER 5
PEAK WATER DEMAND CALCULATOR

C-101.0501.0 General.

C-101.1501.1 Applicability. This appendix provides a The provisions of this chapter shall establish the method for estimating the supply demand load for the building water supply and principal branches and risers for new construction of single- and multi-family dwellings with water-conserving plumbing fixtures, fixture fittings, and appliances. The plumbing code shall be used for all other occupancies.

Note: The requirements listed in this chapter are based on the technical paper entitled “Peak Water Demand Study.” Both the Water Demand Calculator and a copy of this technical paper are available for download at: https://www.iapmo.org/water-demand-calculator/.

C-102.0502.0 Demand Load.

C-102.2502.1 Water Demand Calculator. The estimated supply demand design flow rate for the building supply and principal branches and risers shall be determined by the IAPMO Water Demand Calculator, available for download at: www.iapmo.org/Water-Demand-Calculator/.

C-102.4502.1.1 Water-Conserving Fixtures. The flow rates for plumbing fixtures, fixture fittings, and appliances shall not exceed the design flow rates in Table C-102.4502.1.1.

C-102.6502.1.2 Other Fixtures. Indoor fixtures, fixture fittings, and appliances not included-specified in Table C-102.4502.1.1 shall be added in Rows 12 through 14 in the Water Demand Calculator as Other Fixtures. The probability of use and flow rate for Other Fixtures shall be added by selecting a comparable probability of use and design flow rate from Columns [C] and [E] the Water Demand Calculator.

502.2 Supply Demand. The supply demand flow rate shall be determined in accordance with Section 502.2.1 and Section 502.2.2.

C-102.3502.2.1 Meter and Building Supply. To determine the design-supply demand flow rate for the water meter and building supply, enter the total number of each indoor plumbing fixtures and appliances for the building into Column [B] of the Water Demand Calculator and run the Calculator. (See Figure 502.2.1 Table C-102.3 for an example.)

C-102.4502.2.2 Fixture-Branches and Fixture Supplies Risers. To determine the design supply demand flow rate for fixture-branches and risers, enter the total number of each plumbing fixtures and appliances for the fixture on each branch or riser into Column [B] of the Water Demand Calculator and run the Calculator. The flow rate for one fixture branch and one fixture supply shall be the design flow rate of the fixture according to Table C-102.4502.1.1.
TABLE C.102.1502.1.1
MAXIMUM DESIGN FLOW RATE FOR WATER-CONSERVING PLUMBING FIXTURES, FIXTURE FITTINGS, AND
APPLIANCES IN RESIDENTIAL OCCUPANCIES

<table>
<thead>
<tr>
<th>FIXTURE AND APPLIANCE</th>
<th>MAXIMUM DESIGN FLOW RATE (gallons per minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar Sink</td>
<td>1.5</td>
</tr>
<tr>
<td>Bathtubs(^2)</td>
<td>5.5</td>
</tr>
<tr>
<td>Bidet</td>
<td>2.0</td>
</tr>
<tr>
<td>Clothes Washer(^1)</td>
<td>3.5</td>
</tr>
<tr>
<td>Combination Bath/Shower</td>
<td>5.5</td>
</tr>
<tr>
<td>Dishwasher(^1)</td>
<td>1.3</td>
</tr>
<tr>
<td>Kitchen Faucet</td>
<td>2.2</td>
</tr>
<tr>
<td>Laundry Faucet (with aerator)</td>
<td>2.0</td>
</tr>
<tr>
<td>Lavatory Faucet</td>
<td>1.5</td>
</tr>
<tr>
<td>Shower, per head</td>
<td>2.0</td>
</tr>
<tr>
<td>Water Closet, 1.28 GPF Gravity Tank</td>
<td>3.0</td>
</tr>
<tr>
<td>Other fixtures</td>
<td>6.0</td>
</tr>
</tbody>
</table>

For SI units: 1 gallon per minute = 0.06 L/s

\(^1\) Clothes washers and dishwashers shall have an Energy Star label.

\(^2\) Including whirlpools and similar fixtures.

---

**FIGURE 502.2.1**
WATER DEMAND CALCULATOR

**TABLE C.102.3**
WATER DEMAND CALCULATOR EXAMPLE
(delete table in its entirety)
Continuous Supply Demand. The continuous supply demands in gallons per minute (gpm) for lawn sprinklers, air conditioners, hose bibbs, etc., shall be added to the total estimated demand for the building supply as determined by Section C 102.3. Where there is more than one hose bibb installed on the plumbing system, the demand for only one hose bibb shall be added to the total estimated demand for the building supply. Where a hose bibb is installed on a fixture branch, the demand of the hose bibb shall be added to the design flow rate for the fixture branch as determined by Section C 102.4 determined for the building supply, branches, and risers in accordance with the plumbing code.

Exceptions:
(1) Where there is more than one hose bibb installed on the plumbing system, the demand for only one hose bibb shall be added to the total estimated demand for the building supply.
(2) Where a hose bibb is installed on a principal branch, riser or fixture branch, the demand of the hose bibb shall be added to the design flow rate for the principal branch, riser, or fixture branch as applicable.

Size of Water Piping per Appendix A.

503.1 General. Except as provided in Section C 102.0 for estimating the demand load for single- and multifamily dwellings, the size of each water piping system shall be determined in accordance with the procedure set forth in Appendix A of the 2021 UPC; this section, the procedure for sizing the water supply system shall be determined in accordance with the plumbing code.

503.2 Total Demand Load. The total demand load shall be the sum of the supply demand load calculated in accordance with Section 502.2 and the continuous demand load calculated in accordance with Section 502.3 for the building supply, branches, risers, and fixture branches as applicable.

503.3 Determining Pipe Diameters. After determining the permissible friction loss per 100 feet of pipe and the total demand loads in accordance with Section A 104.0 503.2, and the demand flow in accordance with the Water Demand Calculator, the diameter of the building supply pipe, branches and risers shall be obtained from Chart A 105.1(1), Chart A 105.1(2), Chart A 105.1(3), Chart A 105.1(4), Chart A 105.1(5), Chart A 105.1(6), or Chart A 105.1(7) whichever is applicable, in accordance with Section A 105.0 and Section A 106.0 determined in accordance with Chart 503.3(1) through Chart 503.3(9). Velocities shall be in accordance with Section A 107.1. Appendix I Installation Standard 31-2014 of the 2021 UPC, Figure 3 and Figure 4 shall be permitted when sizing PEX systems.

(renumber remaining chapters)
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa,
1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
CHART 503.3(6)

For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
CHART 503.3(7)

FRICTION LOSS IN HEAD (pounds-force per square inch) PER 100-FOOT LENGTH

For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa,
1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: °C = (°F-32)/1.8, 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
For SI units: °C = (°F-32)/1.8, 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
SUBSTANTIATION:
In response to the committee statement provided for rejecting Item #074, the Premise Water Supply System Design Task Group has generated a public comment to address concerns expressed. The charts, used for determining diameters of building supply pipe, branches, and risers, have been relocated to Chapter 5 as requested. This relocation offers applicable tools and provides additional guidance when implementing the Water Demand Calculator (WDC).

Section 503.3 (Determining Pipe Diameters) is the most appropriate location for referencing these charts as this section addresses the use of permissible friction loss and demand loads in conjunction with the provided sizing charts to determine pipe diameters. The Technical Committee identified this as the only reason for rejection. Therefore, this public comment, along with the public comment submitted for Item #123, should resolve the concerns expressed during the last Technical Committee meeting.

SECTION #: 206.0, 210.0, 1003.7

RECOMMENDATION:

Request to accept the code change proposal as modified by this public comment.

1003.0 Service Hot Water – Low-Rise Residential Buildings.

1003.7 Maximum Hot Water System Ratio. The ratio of the hot water system rectangle to the floor area dwelling unit footprint shall not exceed 60 percent for single-story dwellings and shall not exceed 30 percent for dwellings two or more stories in height. These ratios shall apply to both attached and detached dwelling units.

206.0 - D - Dwelling Unit Footprint. The area within the inside perimeter of the exterior walls of a dwelling unit.

210.0 - H - Hot Water System Ratio. The ratio of the hot water system rectangle to the floor area of a dwelling unit.
Hot Water System Rectangle. The region of a dwelling that bounds the water heater, plumbing fixture fittings that supply hot water, and appliances which use hot water.

SUBSTANTIATION:
In response to the negative comment received on Item #113, the Premise Water Supply System Design Task Group reconvened to discuss and review potential areas of concern or confusion. As a result, the following recommendations were generated:

While the hot water system rectangle accounts for fixtures on all floors, the 60% area is only counted once and does not tally for each additional floor of the unit. Section 1003.7 (Maximum Hot Water System Ratio) has been revised to clarify this distinction. Additionally, the definitions for “hot water system ratio” and “hot water system rectangle” have been updated to further support the revisions made to Section 1003.7 (Maximum Hot Water System Ratio). Since the intent of these provisions pertains to only hot-water distribution and improved efficiency, the phrase “plumbing fixture fittings that supply hot water” is being proposed within the terminology for “hot water system rectangle.”

It was also necessary to specify that the ratio calculations are to be determined using the hot water system rectangle and the “dwelling unit footprint” rather than the “floor area.” Using the floor area would account for the square footage inside the perimeter of the exterior walls of the building instead of the dwelling unit. This update prevents misinterpretations and miscalculations when determining the prescribed ratio. Further clarification has also been provided via the proposed definition for “dwelling unit footprint.”
APPENDIX C
PEAK WATER DEMAND CALCULATOR - EXAMPLES
(This Appendix is based on the technical paper entitled “Peak Water Demand Study.”
A copy of the paper is available for download at: www.iapmo.org/WEStand/Pages/default.aspx)

C 101.0 General.
C 101.1 Applicability. This appendix provides examples illustrating the use of the Water Demand Calculator to estimate the supply demand load for the building water supply and principal branches and risers for single- and multi-family dwellings. See Chart 503.3(1) through Chart 503.3(9) for determining pipe size based on friction loss and maximum allowable pipe velocity.

C 102.0 Examples Illustrating Use of Water Demand Calculator with Appendix A.

C 102.1 Example 1: Indoor Water Use Only. — Use the information given below to find the pipe size for the building supply to a residential building with six indoor fixtures as shown in Figure 4 C 102.1(1) [Pipe Section 4].

Given Information:
Type of construction: Residential, one-bathroom
Type of pipe material: L-copper
Friction loss per 100 ft (30 480 mm): 15 psi (103 kPa)
Maximum velocity: 10.8 ft/s (2.4 m/s)
Fixture number/type: 1 combination bath/shower
1 kitchen faucet
1 lavatory faucet
1 dishwasher
1 WC
1 clothes washer

FIGURE 4 C 102.1(1)
RESIDENTIAL BUILDING WITH SIX INDOOR FIXTURES
Solution: Step 1 of 2 – Find Demand Load for the Building Supply

The Water Demand Calculator [WDC] in Figure 2-C.102.1(2) is used to determine the demand load expected from indoor water use. The WDC has white-shaded cells and gray-shaded cells. The values in the gray cells are derived from a national survey of indoor water use at homes with efficient fixtures and cannot be changed. The white-shaded cells accept input from the designer. For instance, fixture counts from the given information are entered in the column [B] designated as total number of fixtures; the corresponding recommended fixture flow rates are already provided in the flow rate column [D]. The flow rates in Column [D] the white cells may be reduced only if the manufacturer specifies a lower flow rate for the fixture. The last column [E] showing maximum fixture flow rates establishes the upper limits for the flow rates entered into the fixture flow rate column [D]. Clicking the “Run Water Demand CalculatorWDC” button gives 8.59.0 gpm (0.57 L/s) as the estimated indoor water demand for the whole building. This result appears in the dark gray output box on the right-hand side of the WDC in Figure 2-C.102.1(2).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bar Sink</td>
<td>0</td>
<td>2.0</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>Bathtub</td>
<td>0</td>
<td>1.0</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>3</td>
<td>Bidet</td>
<td>0</td>
<td>1.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>4</td>
<td>Clothes Washer</td>
<td>1</td>
<td>5.5</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>5</td>
<td>Combination Bath/Shower</td>
<td>1</td>
<td>5.5</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td>6</td>
<td>Dishwasher</td>
<td>1</td>
<td>0.5</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>7</td>
<td>Kitchen Faucet</td>
<td>1</td>
<td>2.0</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>8</td>
<td>Laundry Faucet</td>
<td>0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>9</td>
<td>Lavatory Faucet</td>
<td>1</td>
<td>2.0</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>10</td>
<td>Shower, per head</td>
<td>0</td>
<td>4.5</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>11</td>
<td>Water Closet, 1.28 GPF Gravity Tank</td>
<td>1</td>
<td>1.0</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>12</td>
<td>Other Fixture 1</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>13</td>
<td>Other Fixture 2</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>14</td>
<td>Other Fixture 3</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Total Number of Fixtures: 6
99th Percentile Demand Flow = 8.5 GPM
Solution: Step 2 of 2 – Determine the Pipe Size of the Building Supply

Chart A 105.1(1) for copper piping systems (from Appendix A of the UPC, shown in Figure 3) is used to determine the pipe size, based on given friction loss, given maximum allowable pipe velocity, given pipe material and the demand load computed in Step 1. In Figure 3-C 102.1(3), the intersection of the given friction loss (15 psi) (103 kPa) and the maximum allowable pipe velocity (108 ft/s) (2.4 m/s) is labeled point A. The vertical line that descends from point A to the base of the chart, intersects four nominal sizes for L-copper pipe. These intersection points are labeled B, C, D, E and correspond to pipe sizes of 1 inch (25 mm), ¾ inch (20 mm), ½ inch (15 mm) and 3/8 inch (10 mm), respectively. A horizontal line from points B, C, D, E to the right-hand side of the chart gives maximum flow rates of 2420 gpm (1.3 L/s), 12 gpm (0.75 L/s), 4.5 gpm (0.28 L/s), and 2.3 gpm (0.15 L/s), respectively. These results are summarized in Table 1-C 102.1 which shows that a ¾-inch (20 mm) L-copper line is the minimum size that can convey the peak water demand of 8.59.0 gpm (0.57 L/s).

For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s

<table>
<thead>
<tr>
<th>POINT IN FIGURE 3 C 102.1(3)</th>
<th>PIPE DIAMETER (inch)</th>
<th>MAXIMUM FLOW (gpm)</th>
<th>OK FOR BUILDING SUPPLY(^\ddagger)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>3/8</td>
<td>2.3</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>1/2</td>
<td>4.5</td>
<td>No</td>
</tr>
<tr>
<td>C</td>
<td>3/4</td>
<td>12</td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>2420</td>
<td>Yes</td>
</tr>
</tbody>
</table>

\(^\ddagger\) For Building in Examples 1, 2, 3, and 4.
For SI units: 1 inch = 25 mm, 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 foot = 304.8 mm, 1 foot per second = 0.3048 m/s
C 102.2 Example 2: Indoor and Outdoor Water Use. – Find the pipe size for the building supply [Figure 4C 102.1(1), Pipe Section 4] if the building in Example 1 adds two outdoor fixtures [hose bibbs, each with a fixture flow of 2.0 gpm (0.13 L/s)].

Solution: Step 1 of 2 – Find Demand Load for the Building Supply
The WDC has been developed exclusively for peak indoor water use which can be viewed as a high frequency short duration process. Because fixtures for outdoor water use may operate continuously for very long periods, they are not included in the WDC. To account for water use from one or more outdoor fixtures, add the demand of the single outdoor fixture with the highest flowrate to the calculated demand for indoor water use. With two hose bibbs, the demand of only one hose bibb is included. Hence, in this example, the total demand for the whole house is $8.5 \times 9.0 \text{ gpm (0.57 L/s)} + 2.0 \text{ gpm (0.13 L/s)} = 10.5 \times 11.0 \text{ gpm (0.70 L/s)}$.

Solution: Step 2 of 2 – Determine the Pipe Size of the Building Supply
Table 4C 102.1 shows that at $10.5 \times 11.0 \text{ gpm (0.70 L/s)}$ the building supply shall be $\frac{3}{4}$-inch in diameter.

C 102.3 Example 3: Indoor, Outdoor and Other Fixture Water Use. – Find the pipe size for the water supply [Figure 4C 102.1(1), Pipe Section 4] if the building in Example 2 adds a kitchen pot filler and a dog bath each with a faucet flow rate of 5.5 gpm (0.35 L/s).

Solution: Step 1 of 2 – Find Demand Load for the Building Supply
The kitchen pot filler and dog bath are not listed in the fixture list column [A] of the WDC. To accommodate cases such as this, the WDC provides up to three additional rows for “Other Fixtures.” Enter the kitchen pot filler and dog bath in the fixture list column [A] of the WDC and enter the fixture count for each in the next column [B]. Find an indoor fixture that has a similar probability of use in the probability column [C] and add that to the column. Finally, enter the flow rate of the kitchen pot filler and dog bath in the flow rate column [D]. The estimated indoor water demand for the whole building is $11.0 \text{ gpm (0.70 L/s)}$, as shown in the WDC in Figure 4-C 102.3. As illustrated in Example 2, the hose bibb will increase the total demand for the whole house to $13.0 \text{ gpm (0.82 L/s)}$.

Note that a reset button is provided to clear any numbers in Column [B] from a previous calculation.

Solution: Step 2 of 2 – Determine the Pipe Size of the Building Supply
Table 4C 102.1 shows that at $13.0 \text{ gpm (0.82 L/s)}$ the building supply shall be 1-inch (25 mm) in diameter.
FIGURE 4-C 102.3
WATER DEMAND CALCULATOR TO ACCOMMODATE OTHER FIXTURES (EXAMPLE 3).

C 102.4 Example 4: Sizing Branches and Risers. For individual hot and cold branches, repeat Steps 1 and 2. For example, for the hot water branch at the water heater [Figure 4C 102.1(1), Pipe Section 3], enter all the fixtures and appliances that use hot water into the Water Demand Calculator (toilets will be excluded) as seen in Figure 5-C 102.4. Use the calculated demand load to find the pipe size in Step 2. Table 4C 102.1 shows that at 7.79.0 gpm (0.57 L/s), the hot water branch shall be ¾-inch (20 mm) in diameter.

For each additional hot and cold branch [Figure 4C 102.1(1), Pipe Sections 1 and 2], enter the number of fixtures and appliances served by that branch into the WDC and use that demand in Step 2 to determine the branch size. If the branch serves a hose bibb, add the demand of the hose bibb to the calculated demand flow for the branch. As discussed in Example 2, the hose bibb is not to be entered into WDC, since the Calculator is for indoor uses only. When there is only one fixture or appliance served by a fixture branch, the demand flow shall not exceed the fixture flow rate in the last column of the Water Demand Calculator. The fixture flow rate would be used in Step 2 to determine the size of the fixture branch and supply.
C 102.5 Example 5: Multi-family Application. When using the WDC for multi-family dwellings, use the drop-down menu on the top left corner that allows you to select either single-family residence or a multi-family building. Choosing the multi-family option opens two more boxes to fill in information. (See Figure C 102.5.) When estimating for a multi-family building, enter the total number of dwelling units in the building. The example shows a total of 100 dwelling units in the building. The box below it will be for the number of units you are calculating for. If you are calculating for the whole building, enter the same number of 100. If you are calculating for half the dwelling units, enter 50. If you are estimating for only one unit, then enter the number one. The total number of units in the first box will not change in any of your calculations. Then use the WDC, as has been explained earlier, for sizing branches and risers.
FIGURE C 102.5
WATER DEMAND CALCULATOR FOR MULTI-FAMILY DWELLINGS (EXAMPLE 5).

SUBSTANTIATION:
In response to the committee statement provided for rejecting Item #123, the Premise Water Supply System Design Task Group has generated a public comment to address concerns expressed.

The charts, used for determining diameters of building supply pipe, branches, and risers, have been relocated to Chapter 5 as shown in the public comment submitted by this Task Group for Item #074. This relocation offers applicable tools and provides additional guidance when implementing the Water Demand Calculator (WDC). The charts have been removed from Appendix C, and references to these charts have been updated accordingly.

The Technical Committee identified this as the only reason for rejection. Therefore, this public comment, in conjunction with the public comment submitted for Item #074, should resolve the concerns expressed during the last Technical Committee meeting.
Water Efficient Landscaping Task Group Report
During the Water Efficiency and Sanitation Standard Technical Committee (WE•Stand TC) Meeting on June 22, 2022 to June 23, 2022, the WE•Stand TC requested that the Water Efficient Landscaping Task Group reconvene to review their respective proposals and generate public comments for Technical Committee consideration. Following the WE•Stand TC Meeting, the Task Group conducted two meetings to complete this goal.

The scope of the Water Efficient Landscaping Task Group, as approved by the WE•Stand TC, was to develop provisions for improving water efficiency and conservation in landscaping applications.

The Task Group began with reviewing the definition of “water feature,” as proposed in Item #038. Based on the provided committee statement and comments received on this item, the Task Group revised the definition to include a list of applicable landscape elements. Additionally, language stating that water features are “supplied with water for the purposes of maintaining a pool for surface water, excluding a swimming pool or spa” was removed as there exists water features which do not involve surface pooling of water. The revised definition also makes clear that water features apply to elements that are installed either inside or outside of a building.

Following this intent, a minor revision was made to Section 410.1 (Use of Alternate Water Source for Special Water Features) pertaining to this distinction. Lastly the definition of “vegetated landscape,” as proposed in Item #059, was revised to include “water features” as a portion of this landscape category. Such inclusion is necessary as it ensures that water features are accounted for within the calculations used to determine compliance with the percentage-based limitations specified in Section 415.4 (Plant and Irrigation System Limitations). With this clarification, all high water use areas in the landscape will fall under the same limitation.

Upon completion of the Task Group’s meetings, 2 public comments were generated and submitted to the WE•Stand TC for consideration during the May 17, 2023 to May 18, 2023 WE•Stand Technical Committee Meeting.
SECTION #: 225.0, 410.1

RECOMMENDATION:

Request to replace the code change proposal by this public comment.

225.0 - W -

**Water Feature.** An element, built primarily for ornamental purposes, and supplied with water. Such elements may include, but are not limited to, ponds, reflection pools, streams, waterfalls, and water fountains. Water features may be installed indoors or outdoors.

410.0 Fountains and Other Water Features.

410.1 Use of Alternate Water Source for Special Water Features. **Special Outdoor** water features such as ponds and water fountains shall be provided with reclaimed (recycled) water, rainwater, or on-site treated nonpotable water where the source and capacity is available on the premises and approved by the Authority Having Jurisdiction.

**SUBSTANTIATION:**

The original Task Group proposal which defines “water feature” uses the phrase “maintaining a pool for surface water” as one of the defining characteristics of a water feature. While at one time that may have been true, for some time now, water features that do not involve surface pooling of water have existed. The proposed changes expand this definition to include the range of ornamental water elements and systems intended to be covered by the standard.

The public comment also makes clear that the definition applies to elements that are either installed inside or outside of a building. An accompanying change to Section 410.1 (Use of Alternate Water Source for Special Water Features) is then needed to clarify that only outdoor water features are required to use “reclaimed (recycled) water, rainwater, or on-site treated nonpotable water” as this is in the interests of protecting human health and safety.

SECTION #: 214.0

RECOMMENDATION:

Request to accept the code change proposal as modified by this public comment.

214.0 - L -

**Landscape, Vegetated.** That portion of a landscape in which living plant material, and porous landscape elements, and water features are installed or maintained, or is prepared for the installation of such material, not including vegetated roofs or undisturbed native vegetation maintained without supplemental irrigation.

**SUBSTANTIATION:**

This revision is needed to fully define the scope of the term “vegetated landscape.” It is important that the area of the vegetated landscape be unambiguously defined because the core requirements for landscape water efficiency in Section 415.4 (Plant and Irrigation System Limitations) apply to percentages of the vegetated landscape (i.e., plants not requiring supplemental irrigation shall comprise no less than 60% of the vegetated landscape, and an irrigation system shall not be installed to serve more than 40% of the vegetated landscape).
The 2020 edition of the WEStand includes the same percentage-based limitations but applies them to an undefined term, “landscaped area,” which rendered the requirement largely unenforceable. The removal of this ambiguity was one of the primary objectives of the Task Group, and the inclusion of water features closes the missing link in the area covered by the percentage requirement. It is appropriate to include water features in the calculations for determining the portion of the landscape that is subject to these requirements because in many cases the evaporative losses per square foot from a water feature are comparable to the ET losses from turf. With this clarification, the requirements in Section 415.4 (Plant and Irrigation System Limitations) will bring all high water use areas in the landscape under the same limitation.