WATER EFFICIENCY AND SANITATION STANDARD (WE-STAND)

TECHNICAL COMMITTEE MEETING

PUBLIC COMMENT MONOGRAPH

IAPMO WORLD HEADQUARTERS, ONTARIO, CA.

MARCH 28-29, 2017

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

IAPMO World Headquarters, Ontario, CA.
March 28-29, 2017 - 8:00 a.m.

AGENDA

March 28, 2017 - 8:00 a.m.

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

March 29, 2017 - 8:00 a.m.

1. Call to Order
2. Chairman Comments
3. Announcements
4. Continuation of Review and Discussion of Public Comments to the Water Efficiency and Sanitation Standard (WE-Stand)
5. Other business
6. Tentative schedule for next cycle
7. Adjournment

Public Comment Recommendations and TC Actions

All Public Comments are recommendations for actions taken by the Technical Committee on the proposals published in the 2016 Report on Proposals. There are four possible recommendations forwarded by Public Comments for the Technical Committee to consider.

1. Request to reject the code change proposal by this public comment.
   No proposed changes. The request is to reject the original proposal completely.
2. Request to accept the code change proposal as submitted by this public comment.
   No proposed changes. The request is to accept the original proposal as submitted.
3. Request to accept the code change proposal as amended by the TC by this public comment.
   No proposed changes. The request is to accept the proposal as it was amended by the TC.
4. Request to accept the code change proposal as modified by this public comment.
   The proposed changes are included in the Proposed Text box.

At the open meeting, the Technical Committee will take action on each Public Comment by one of the following motions:

1. Accept the Comment as submitted;
2. Accept the Comment as amended; or
3. Reject the Comment

The motion will carry by majority vote. The TC action on Comments "accept as amended" or "rejected" shall include a statement, technical in nature, on the reason for the TC action. Such statement shall be sufficiently detailed so as to convey the TC's rationale for its action.

After the open meeting, the TC action on Comments shall be submitted to a letter ballot. The balloting period for the TC is from April 17, 2017, through May 15, 2017.

TENTATIVE ORDER OF DISCUSSION
Proposed Changes to the 2017 WE-Stand

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

Item #014
Item #026
Item #027
Item #028
Item #029
Item #032
Item #033
Item #034
Item #046
Item #050
Item #054
Item #056

Item #057
    Item #067

Item #060
    Item #064

Item #062
Item #063

Item #086

Item #087
Item #088

Item #089
    Item #092

Item #097
Item #098
Item #100

Item #101
    Item #117

Item #104
    Item #131

Item #109

Item #127
Item #128

Item #129
Item #135
Item #141

Item #143
    Item #010

Item #156
Item #157
Item #159
TC Proposal 6
TC Proposal 9
Extract Update

WE-Stand 2017 – (208.0) Item # 010

Name:	Gary Morgan
Organization:	Viega LLC
Recommendation:	Add text
Section Number:	208.0
Proposed Text:	**208.0** **Flow-Through Fitting**: A multiport piping connection that has two primary piping supply connections and one outlet connection with the purpose to supply water (hot or cold) to an end use plumbing fixture. The design of a flow-through fitting allows for non-restricted water to constantly flow through the fitting regardless if there is demand from the end use fixture or not. Flow-through fittings are typically used in order to keep water from cooling or stagnating as is otherwise typical in a traditional branch legs serving individual fixtures. When properly integrated into hot-water recirculation systems the wait time for hot-water is minimized thus saving both water and energy.
Problem Statement:	Add new definition for flow-through fittings.The term "Flow-through fitting" is being introduced in separate code proposals as an addition to section 702.7.1.
Referenced Standards:	

TC ACTION:
Reject

TC SUBSTANTIATION:
Not required, term not used in document.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 24, NEGATIVE: 2, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
HOFFMAN: Not required, term not used in document.
SIGLER: This proposal and Item #143 outline a truly efficient method for delivering hot water. I would encourage the proponent to submit additional technical data, during the public comment stage, to further substantiate these proposals.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (208.0) Item # 010

Name:	Gary Morgan
Organization:	Viega LLC
Recommendation:	Request to accept the code change proposal as modified by this public comment.

Section Number:	208.0
Proposed Text:	**Add new definition in section 208.0** Note: This new definition (proposal #010) is dependent on the outcome of proposal #143. **Flow-Through Fitting**: A multiport piping connection that has two primary piping supply connections and one outlet connection with the purpose to supply water (hot or cold) to a fixture fitting ~~an end use plumbing fixture~~. The design of a flow-through fitting allows for non-restricted water ~~to constantly~~ flow through the fitting regardless if there is flow demand from the end use ~~fixture or not~~ fixture fitting. Flow-through fittings are typically used in order to keep water from cooling or stagnating as is otherwise typical in ~~a traditional~~ dead branch legs serving individual ~~fixtures~~ fixture fittings. When properly integrated into hot-water ~~recirculation~~ plumbing systems the wait time for hot-water is minimized thus saving both water and energy.
Problem Statement:	The proposed new definition for flow-through fitting (Proposal #010) needed some minor revisions to be consistent with the revised language of the public comment on #143 (G. Morgan). "Fixture fitting" is the proper term for the plumbing fixture in the Uniform Codes.
Referenced Standards:	

WE-Stand 2017 – (214.0) Item # 014

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

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 22, NEGATIVE: 4, NOT RETURNED: 2 Gray, Tabakh

COMMENT ON AFFIRMATIVE:
MECHAM: 6.3 gph or 24L/h is the maximum flow rate an emitter can have to be classified as a drip emitter. It is consistent with ASABE/ICC 802 standard and is consistent with ISO 9261, which defines the maximum flow rate for an emitter of 24 L/h. The idea of a standardized definition is to help improve communication by affected parties.

EXPLANATION OF NEGATIVE:
ALLEN: I agree with Tom Pape's comment.
KRAUSE: Agree with Mr. Pape, and also this proposed change is to align with ASABE/ICC definition of drip emitter, not low flow emitter, not justified.
MANN: I agree with Tom Pape's statement.
PAPE: Improved water efficiency was not claimed, nor was any evidence provided that 6.3 GPH was superior to 4 GPH. There is no evidence presented that assert using the same definition of ASABE/ICC 802-2014 improves water use efficiency.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (214.0) Item #014

Name:	Thomas Pape

Organization:	AWE
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	214.0
Proposed Text:	
Problem Statement:	The Proposal confused low flow emitter with drip emitter. This document uses the term low flow emitter, not limited to drip emitters. There was no substantiation as to why the proposed change improved water efficiency.
Referenced Standards:	

Name:	John Koeller
Organization:	Koeller and Company
Recommendation:	Revise text
Section Number:	402.2-402.2.2 and Table 402.1, Table 901.1

Proposed Text:

402.2 Water Closets. No water closet shall have a flush volume exceeding ~~1.6 gallons (6.0 L)~~ 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 or ASME A112.19.14 and shall also be listed to the EPA WaterSense Tank-Type High Efficiency Toilet Specification. The effective flush volume for dual-flush toilets is defined as the composite, average flush volume of one ~~two~~ reduced flush~~es~~ 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 ~~1.6 gallons (6.0 L)~~ 1.28 gallons (4.8 Lpf) 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.

Table 402.1
MAXIMUM FIXTURE AND FIXTURE FITTINGS FLOW RATES

Water Closets ~~- other than remote locations[4]~~	1.28 gallons/flush
~~Water Closets - remote locations[4]~~	~~1.6 gallons/flush~~

~~[4] Remote location is where a water closet is located at least 30 feet upstream of the nearest drain line connections or fixtures, and is located where less than 1.5 drainage fixture units are upstream of the water closet's drain line connection.~~

(renumber remaining footnotes)

TABLE 901.1
REFERENCED STANDARDS

STANDARD NUMBER-YEAR	STANDARD TITLE	REFERENCED SECTION
EPA WaterSense 2015	Specification for Flushometer-Valve Water Closets	402.2.2

(portions of tables not shown remain unchanged)

Problem Statement:

The advancement of product and building design, the success of dual-flush toilets with a maximum full flush of 1.28 gpf, and the release of a WaterSense specification for labeling flushometer valve/bowl combination water closets makes adjustments to the flush volume requirements of this standard feasible. As proposed, the above revisions make this standard consistent with the provisions of ASHRAE SS189.1.

Provided for reference:
(1) a listing of MaP-tested dual-flush toilets that meet special criteria (including WaterSense and a 1.28 gallon maximum full flush and

	(2) a listing of flushometer valve/bowl combination water closets with a flush volume of 1.28 gpf or less.
Referenced Standards:	ASME A112.19.2/CSA B45.1; ASME A112.19.14; EPA WaterSense Specification for Flushometer-Valve Water Closets; EPA WaterSense Tank-Type High Efficiency Toilet Specification

Note: ASME A112.19.2/CSA B45.1 and ASME A112.19.14 meets the requirements for a mandatory reference standard in accordance with Section 15.0 of Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

Note: EPA WaterSense Specification for Flushometer Valve Water Closets and EPA WaterSense Tank-Type High Efficiency Toilet Specification was not developed via an open process having a published development procedure in accordance with Section 15.2 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

TC ACTION:
Accept as amended:

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 or ASME A112.19.14 and shall also be listed to the EPA WaterSense Tank-Type High Efficiency Toilet Specification. The effective flush volume for dual-flush toilets is defined as the composite, average flush volume of ~~one~~ 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 Lpf) 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.

Table 402.1 **MAXIMUM FIXTURE AND FIXTURE FITTINGS FLOW RATES**	
Water Closets	1.28 gallons/flush
[4] (renumber remaining footnotes)	

TABLE 901.1 **REFERENCED STANDARDS**		
STANDARD NUMBER-YEAR	**STANDARD TITLE**	**REFERENCED SECTION**
EPA WaterSense 2015	Specification for Flushometer-Valve Water Closets	402.2.2

(portions of tables not shown remain unchanged)

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 22, NEGATIVE: 4, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
HOFFMAN: See Tom Pape's comments. Follow AWE language.
KOELLER: Agree with the comments of Thomas Pape. The 'effective flush volume' (EFV) definition related to tank-type dual-flush toilets was adopted out of necessity for the WaterSense tank-type toilet specification around 2006. The average ratio of reduced flushes to full flushes was determined even before that (2003) on the basis of 4 studies in the U.S. and Canada.
In those 4 studies, the ratios widely varied from the 2.0 to 1.0 ratio subsequently adopted into WaterSense.
Seattle, 2000, residential: 0.8 to 1.0 (20 dwellings)
Oregon, SWEEP study, 2000, residential: 1.9 to 1.0 (50 dwellings)
Jordan Valley, Utah, 2003, residential: 1.48 to 1.0 (61 fixtures)
Ontario, Canada, 2002, commercial food service: 1.3 to 1.0
Ontario, Canada, 2002, commercial office: 1.7 to 1.0
Ontario, Canada, 2002, single-family residential: 1.6 to 1.0
Ontario, Canada, 2002, multi-family residential: 4.0 to 1.0
The Ontario study results shown above are represented by a total of 56 dual-flush toilets.
Because of the very limited breadth of the above work, manufacturers and most water-efficiency professionals agree today that these numbers are not really representative of today's 'real world.' Yet, out of necessity in 2006, WaterSense chose 2.0 to 1.0 as their preferred ratio for calculation of the EFV.
A great deal of debate has taken place in recent years over the ratio. Evidence has surfaced in the recent past that the ratio is much lower than 2.0 to 1.0. That is disputed. However, in 2014-15, ASHRAE's ANSI Standard 189.1 for high performance green buildings rid itself of the term EFV, calculation ratios, and the separation of dual-flush from single flush. They massively simplified the standard in this area; it now provides for a simple 1.28 gallon per flush maximum regardless of the toilet design. That is what was originally proposed here and is what is fully justified.
MANN: This is in conflict with the UPC. Also, EPA is a guideline and not an ANSI Standard.
PAPE: The "effective flush volume" was developed as a guess - that guess is proven to be grossly inaccurate in commercial settings. There are many many many HETs on the market that exceed all the performance tests and never flush more than 1.28. It is well known that in commercial settings the partial flush is seldom used. Essentially the toilets needing the "effective flush" loophole are ULFTs (1.6 GPF) masquerading as HETs in commercial settings. If it doesn't act like an HET, it’s not high efficiency.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (402.2) Item # 026

Name:	John Koeller
Organization:	Koeller and Company
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	402.2
Proposed Text:	**402.2 Water Closets.** No water closet shall have a~~n 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 or ASME A112.19.14 and shall also be listed to the EPA WaterSense Tank-Type High Efficiency Toilet Specification. ~~The effective flush~~

	~~volume for dual-flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.~~
Problem Statement:	As stated in the original proposal, there is NO LONGER A NEED for computing an "effective flush volume" for dual-flush water closets. This confusing and controversial calculation is easily eliminated from future discussions by setting a simple maximum flush volume for both residential and commercial installations. First, the data contained in the original proposal (and backed up by referenced documents) shows that the use of the 'reduced flush' is varies significantly from the 2 to 1 ratio adopted into some codes and standards. The old 2:1 ratio resulted from very small studies conducted over 10 years ago just as dual-flush toilets were introduced into North America (for the second time) in the early 2000s. Today, we have studies from Australia (where dual flush has been in place for over 25 years) that show the ratio there is closer to 1:1. As such, this justifies a single threshold of 1.28 gallons per flush, without the need for the an 'effective flush volume' calculation. In December 2015, WaterSense released its flushometer water closet specification. That specification limited the full flush volume to 1.28 gallons. This new limitation was based upon 'real world' research into the efficacy of current water closet designs and building conditions. There is no longer a need for commercial flushometer water closet volume thresholds to be set at 25-YEAR OLD REQUIREMENTS (EPAct 92) in a 2017 standard. The building and plumbing industries have advanced well beyond the design parameters of 1992!
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (402.2) Item #026

Name:	Thomas Pape
Organization:	AWE / BMP
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	402.2
Proposed Text:	**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 or ASME A112.19.14 and shall also be listed to the EPA WaterSense Tank-Type High Efficiency Toilet Specification. 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 Lpf) 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.~~

TABLE 901.1
REFERENCED STANDARDS

STANDARD NUMBER-YEAR	STANDARD TITLE	REFERENCED SECTION
~~EPA WaterSense 2015~~	~~Specification for Flushometer- Valve Water Closets~~	~~402.2.2~~

Problem Statement:	The "effective flush volume" was developed as a best-guess, and now that guess is proven to be grossly inaccurate in commercial settings. There are many HETs on the market that exceed all the performance tests and never flush more than 1.28. It is well known that in commercial settings the partial flush is seldom used. Essentially the toilets needing the "effective flush" loophole are ULFTs (1.6 GPF) masquerading as HETs in commercial settings. If it doesn't act like an HET, it's not high efficiency. Now, that guess is proven to be grossly inaccurate in commercial settings, and unnecessary. There are many HETs on the market that exceed all the performance tests and never flush more than 1.28. It is well known that in commercial settings the partial flush is seldom used. Essentially the toilets needing the "effective flush" loophole are ULFTs (1.6 GPF) masquerading as HETs in commercial settings. If it doesn't use water like an HET, it's not high efficiency.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 3:

WE-Stand 2017 – (402.2) Item # 026

Name:	Edward Osann
Organization:	Natural Resources Defense Council
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	402.2
Proposed Text:	**402.2 Water Closets.** No water closet shall have ~~an effective~~ <u>a</u> flush volume exceeding 1.28 gallons (4.8 Lpf) per flush (gpf). <u>**Exception:** Water closets installed to discharge to a building's existing sanitary drainage piping shall not exceed 1.6 gallons (6.0 Lpf) of water per flush.</u> **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 Tank-Type High Efficiency Toilet Specification. ~~The effective flush volume for dual-flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.~~ [Other text of proposal remains unchanged.]
Problem Statement:	The reasons stated in the original Problem Statement for Item 026, together with the Explanations of Negative Votes by TC members remain valid. This comment would restore a maximum flush volume of 1.28 gpf, which was found to provide satisfactory drain line

	transport through two rounds of PERC studies. Out of an abundance of caution, this comment would provide an exception to allow 1.6 gpf water closets to be installed where such units are being connected to an existing building drainage system, as in major building remodeling and renovation requiring a permit.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 4:

WE-Stand 2017 – (402.2 – 402.2.2, Table 402.1, Table 901.1) Item # 026

Name:	Robert Pickering
Organization:	Eastern Research Group, Inc.
Recommendation:	Request to accept the code change proposal as amended by the TC by this public comment.
Section Number:	402.2.2
Proposed Text:	
Problem Statement:	WaterSense has released a specification for flushometer-valve water closets that establishes a maximum flush volume of 1.28 gallons. This should be incorporated by reference for water efficiency and performance purposes. Specification can be found here: www.epa.gov/watersense/products/docs/FinalFVHET_Specification_V1-0_508.pdf
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 5:

WE-Stand 2017 – (Table 901.1) Item #026

Name:	Robert Pickering
Organization:	Eastern Research Group, Inc.
Representing:	EPA WaterSense
Recommendation:	Request to accept the code change proposal as submitted by this public comment.
Section Number:	Table 901.1
Proposed Text:	
Problem Statement:	Agreeing with adding a row for new referenced standard (WaterSense Specification for Flushometer-Valve Water Closets). It was released in 2015 and should be referenced in Section 402.2.2 based on our other comment.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 6:

WE-Stand 2017 – (402.2 – 402.2.2, Table 402.1, Table 901.1) Item # 026

Name:	Robert Pickering
Organization:	Eastern Research Group, Inc.
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	402.2.1
Proposed Text:	**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 L) 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 ~~Tank-Type High Efficiency Toilet Specification~~. The effective flush volume for dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.
Problem Statement:	WaterSense specification is incorrectly referenced. Please correct reference in Table 901.1 as well.**
Referenced Standards:	

**Staff Note: An editorial correction will be made accordingly.

WE-Stand 2017 – (402.2.2) Item # 027

Name:	Cambria McLeod
Organization:	Kohler
Recommendation:	Revise text
Section Number:	402.2.2
Proposed Text:	**402.2.2 Flushometer-Valve Activated Water Closets**. Flushometer-valve activated water closets shall ~~have a maximum flush volume of not more than 1.6gallons (6.0 L) of water per flush in accordance~~ comply with ASME A112.19.2/CSA B45.1.
Problem Statement:	Consistency with the proposed change to Section 402.2, relegating the maximum consumption of 1.6gpf as an exception, obligates the removal of a specified flow rate as it otherwise becomes redundant and unclear.
Referenced Standards:	ASME A112.19.2/CSA B45.1

Note: ASME A112.19.2/CSA B45.1 meets the requirements for a mandatory reference standard in accordance with Section 15.0 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

TC ACTION:
Reject

TC SUBSTANTIATION:
The committee prefers the action taken on item #026, which is more complete.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 26, NOT RETURNED: 2 Gray, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (402.2.2) Item # 027

Name:	John Koeller
Organization:	Koeller and Company
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	402.2.2

Proposed Text:	**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 ~~1.6~~gallons (~~6.0~~ 4.8 L) of water per flush in accordance comply with ASME A112.19.2/CSA B45.1.
Problem Statement:	This proposed change to a section that was previously proposed for change (and rejected) brings 402.2.2 in sync with (1) the proposal for 402.2.1, (2) the U.S. EPA WaterSense specification for flushometer water closets, AND (3) with ASHRAE SS189.1, Standard for High Performance Buildings.------------- In December 2015, WaterSense released its flushometer water closet specification. That specification limited the full flush volume to 1.28 gallons. This new limitation was based upon 'real world' research into the efficacy of current water closet designs and building conditions. There is no longer a need for commercial flushometer water closet volume thresholds to be set at 25-YEAR OLD REQUIREMENTS (EPAct 92) in a 2017 standard. The building and plumbing industries have advanced well beyond the design parameters of 1992!
Referenced Standards:	

Name:	John Koeller
Organization:	Koeller and Company
Recommendation:	Revise text
Section Number:	402.3
Proposed Text:	**402.3 Urinals.** Urinals shall have a maximum flush volume of not more than ~~0.5 gallon (1.9 L)~~ <u>0.25 gallon (0.9 L)</u> 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 Flushing Urinal Specification.
Problem Statement:	The reduction of urinal flush volumes for new construction is overdue. While the national product standard remains at 1.0 gpf, the WaterSense specification sets their voluntary maximum at 0.5 gpf. Furthermore, the State of California has set a new maximum at 0.125 gpf. While a reduction to the California threshold might be appropriate for that State, it is recommended that WE-Stand select a threshold below that of the WaterSense maximum, but not as low as California. A maximum of 0.25 gpf (1 quart of water) be selected. In the flushing urinal category as of January 22, 2016 (as illustrated in the attached MaP list of high-efficiency urinals), 132 different product models were offered in the U.S. marketplace, divided as follows: 0.25 gpf - 35 urinal models (of which 32 are WaterSense certified), 7 different brands 0.125 gpf - 97 urinal models (of which 90 are WaterSense certified), 19 different brands Ample product exists, sourced from a large number of manufacturers and brands. Provided for reference: MaP list of high-efficiency urinals and WaterSense specification for flushing urinals
Referenced Standards:	ASME A112.19.2/CSA B45.1 Ceramic Plumbing Fixtures; WaterSense Specification for Flushing Urinals; CSA B45.5/IAPMO Z124

Note: ASME A112.19.2/CSA B45.1 and CSA B45.5/IAPMO Z124 meets the requirements for a mandatory reference standard in accordance with Section 15.0 of Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

Note: EPA WaterSense Flushing Urinal Specification was not developed via an open process having a published development procedure in accordance with Section 15.2 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 17, NEGATIVE: 8, NOT RETURNED: 3 Gray, Saltzberg, Tabakh

EXPLANATON OF NEGATIVE:
KRAUSE: I agree with Mr. Sigler et al.
MANN: I agree with Matt Sigler's statement.

Also, the ASME A112.19.2 test is to 0.5 and not 0.25 as suggested. Furthermore, CSA B45.5-11/IAPMO Z124-2011 refers back to the requirements of ASME A112.19.2.
RAWALPINDIWALA: We agree with Matt Sigler's comment.
SIGLER: Proposed flush volume is below EPA WaterSense requirements. PMI’s research study (refer to attached) for toilets, lavatory faucets and showerheads made it quite clear that EPA WaterSense products are not getting into people’s homes and places of business. The WE-Stand should focus on making the public aware of EPA WaterSense products versus developing a new arbitrary flush volume of 0.25 gpf. Download: href='/apps/org/workgroup/wetc/download.php/100242/PMI's WaterSense-market-penetration-study.pdf' title='PMI's WaterSense-market-penetration-study.pdf'>PMI's WaterSense-market-penetration-study.pdf.
SOVOCOOL: I concur with Tom Pape's reasoning.
STEFFENSON: Standard should be set to .125 gallons per flush. As noted in ballot problem statement, ample product exists at the .125 gallons per flush level to increase water savings.
TINDALL: I agree with Matt and Dave That setting an arbitrary [flush volume] only confuses the market place, we should follow WaterSense.
YEGGY: Below the WaterSense specification.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (402.3) Item #028

Name:	Matt Sigler
Organization:	Plumbing Manufacturers International
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	402.3
Proposed Text:	
Problem Statement:	Proposed flush volume is below EPA WaterSense requirements. PMI's research study for the U.S. market penetration of WaterSense toilets, lavatory faucets and showerheads made it quite clear that EPA WaterSense products are not getting into people's homes and places of business (refer to attached study). The WE-Stand should focus on making the public aware of EPA WaterSense products versus developing a new arbitrary flush volume of 0.25 gpf.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (402.3) Item # 028

Name:	Robert Pickering
Organization:	Eastern Research Group, Inc.
Representing:	EPA WaterSense

Recommendation:	Request to accept the code change proposal as modified by this public comment
Section Number:	402.3
Proposed Text:	**402.3 Urinals.** Urinals shall have a maximum flush volume of not more than 0.25 gallons (0.9L) 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 ~~Flushing Urinal Specification~~.
Problem Statement:	WaterSense specification is incorrectly referenced. Reference in Table 901.1 should also be corrected.**
Referenced Standards:	

**Staff Note: An editorial correction will be made accordingly.

Name:	David Purkiss
Organization:	NSF International
Recommendation:	Revise text
Section Number:	402.4
Proposed Text:	**402.4 Residential Kitchen Faucets.** The maximum flow rate of residential kitchen faucets, including auxiliary water filtration system 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 1.8 gpm (6.8 L/m) at 60 psi (414 kPa) upon valve closure.
Problem Statement:	CEC has determined that auxiliary water filtration system faucets need to meet the kitchen faucet flow rate performance requirement so this should be stated in this section.
Referenced Standards:	

TC ACTION:
Reject

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 16, NEGATIVE: 9, ABSTENTION: 1, NOT RETURNED: 2 Gray, Tabakh

NOTE: Item #029 failed to achieve the necessary 2/3 affirmative vote of returned ballots. In accordance with Section 6.8.2 of the Regulations Governing Consensus Development of WE•Stand, a public comment is requested for this proposal. The technical committee will reconsider this proposal as a public comment.

COMMENT ON AFFIRMATIVE:
SIGLER: The reasons this proposal should be "rejected" are:
1. ASME A112 Committee recently interpreted that filtration faucets should not be considered as kitchen faucets.
2. WE-Stand is not a California-only standard. Just because CEC Staff interprets that the performance requirements for kitchen faucets within CA Title 20 apply to filtration faucets does not mean it should be universally applied everywhere else.

EXPLANATION OF NEGATIVE:
ALLEN: I agree with the two other commenters.
HOFFMAN: I agree with Tom Pape.
KOELLER: Concur with the comment of Thomas Pape.
KRAUSE: I agree with Mr. Pape and Mr. Koeller. No reason was given for rejection. Flow rates for kitchen faucets and other filtration devices installed on kitchen faucets should be the same.
MAJEROWICZ: There is no reason to reject.
MECHAM: TC did not give explanation why it is rejected and the proposed change seems to be appropriate.
PAPE: I can think of no reason to reject, and the TC did not list a reason for rejection.

SHAPIRO: Agree with other negative comments.
SOVOCOOL: No reason is provided for rejection by the TC.

COMMENT ON ABSTENTION:
DIGIOVANNI: Agree with the posted negative comments.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (402.4) Item # 029

Name:	David Purkiss
Organization:	NSF International
Recommendation:	Request to accept the code change proposal as submitted by this public comment.
Section Number:	402.4
Proposed Text:	**402.4 Residential Kitchen Faucets.** The maximum flow rate of residential kitchen faucets, including auxiliary water filtration system 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 1.8 gpm (6.8 L/m) at 60 psi (414 kPa) upon valve closure.
Problem Statement:	CEC has determined that auxiliary water filtration system faucets need to meet the kitchen faucet flow rate performance requirement so this should be stated in this section.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (402.4) Item # 029

Name:	Matt Sigler
Organization:	Plumbing Manufacturers International
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	402.4
Proposed Text:	
Problem Statement:	1. ASME A112 Committee interpreted that filtration faucets should not be considered as kitchen faucets (refer to attached interpretation). 2. WE-Stand is not a California-only standard. Just because CEC Staff interprets that the performance requirements for kitchen faucets within CA Title 20 apply to filtration faucets does not mean it should be universally applied everywhere else.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 3:

WE-Stand 2017 – (402.4) Item # 029

Name:	John Koeller
Organization:	Koeller and Company
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	402.4
Proposed Text:	**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 with an override actuator, 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) upon release of the actuator by the user ~~valve closure~~.
Problem Statement:	The current language allows the valve to be open in the override position indefinitely, closing ONLY when the valve is closed from the override position of 2.2 gpm to zero. This allows continuous flow at 2.2 gpm without regard for the actual need (e.g., for pot filling). The proposed language would require that the valve revert from 2.2 gpm to 1.8 gpm immediately upon release of the actuator (e.g., a handle or lever) by the user of the faucet.
Referenced Standards:	

Name:	Cambria McLeod
Organization:	Kohler
Recommendation:	Revise text
Section Number:	402.6.2
Proposed Text:	**402.6.2 Multiple Showerheads Serving One Shower Compartment.** The total allowable flow rate of water from multiple showerheads flowing at any given time, with or without a diverter, including rain systems, waterfalls, bodysprays, and jets, shall not exceed 2.0 gpm (7.6 L/m) per shower compartment, where the floor area of the shower compartment is less than 1800 square inches (1.161 m^2). For each increment of 1800 square inches (1.161 m^2) of floor area thereafter or part thereof, additional showerheads are allowed, provided the total flow rate of water from all flowing devices shall not exceed 2.0 gpm (7.6 L/m) for each such increment. **Exceptions:** (1) Gang showers in non-residential occupancies. Singular showerheads or multiple shower outlets serving one showering position in gang showers shall not have more than 2.0 gpm (7.6 L/m) total flow. (2) Where provided, shower compartments required for persons with disabilities in accordance with Table 901.1 shall not have more than 4.0 gpm (15.0 L/m) total flow, where one outlet is the hand shower. ~~The hand shower shall have a control with a nonpositive shutoff feature.~~
Problem Statement:	It is redundant and unnecessary to require specific product accessibility features, such as nonpositive shutoff, in this standard because appropriate accessibility requirements will be adopted by the local Authority Having Jurisdiction.
Referenced Standards:	

TC ACTION:
Reject

TC SUBSTANTIATION:
The possibility of a cross-connection is increased without requiring a nonpositive shutoff feature.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 24, NEGATIVE: 2, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
RAWALPINDIWALA: This is a requirement under accessibility standards.
SIGLER: As indicated in Exception 2, accessible showers are required to be designed in accordance with ICC A117.1 as referenced in Table 901.1. Therefore, it is unnecessary to include specific product accessibility text in the code.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

Name:	Matt Sigler
Organization:	PMI
Recommendation:	Request to accept the code change proposal as submitted by this public comment.
Section Number:	402.6.2
Proposed Text:	
Problem Statement:	As indicated in Exception 2, accessible showers are required to be designed in accordance with ICC A117.1 as referenced in Table 901.1. Therefore, it is unnecessary to include specific product accessibility text in the code.
Referenced Standards:	

Name:	Matt Sigler
Organization:	PMI
Recommendation:	Revise text
Section Number:	402.6.3
Proposed Text:	**402.6.3 Bath and Shower Diverters.** Tub spout bath and shower diverters, while operating in the shower mode, shall perform ~~with zero leakage~~ <u>in accordance with ASME A112.18.1/CSA B125.1</u>.
Problem Statement:	As written, this 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 meet the performance requirements of ASME A112.18.1/CSA B125.1 which are already addressed in Section 5.3.6.1 of the standard. The methods for testing the rate of leakage are intended to be conducted in a laboratory while conducting product testing, and not in the field where the accuracy of such testing can be jeopardized. It should be pointed out that a project was opened by the ASME A112.18.1/CSA B125.1 Standard Committee back in January 2014, as requested by the original proponent of the text in the WE-Stand, to address the maximum rate of leakage from diverters. As of June 2015, no proposal has been submitted by the proponent for consideration by the committee. Therefore, until such requirements are revised first by the ASME A112.18.1/CSA B125.1 Standard Committee, they have no business being addressed separately in an installation code or standard such as the 2017 WE-Stand.
Referenced Standards:	ASME A112.18.1/CSA B125.1

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

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 17, NEGATIVE: 7, ABSTENTION: 1, NOT RETURNED: 3 Gray, Steffenson, Tabakh

COMMENT ON AFFIRMATIVE:
SIGLER: The reasons this proposal should be "approved" are:
1. The WE-Stand is not a “product/testing standard” such as ASME A112.18.1/CSA B125.1 which dictates how a manufacturer is to design, produce and test their products, but is more in line with an installation standard that governs the installation of specific products or systems.
2. The rate of leakage for a tub spout bath and shower diverter is determined in a laboratory based on the requirements of ASME A112.18.1/CSA B125.1, and not in the field. Therefore, requiring leakage requirements to be called out in an installation standard such as WE-Stand is inappropriate, and should be corrected by referencing ASME A112.18.1/CSA B125.1.

3. It should be pointed out that a project was opened by the ASME A112.18.1/CSA B125.1 Standard Committee back in January 2014, as requested by the original proponent of the text in the WE-Stand, to address the maximum rate of leakage from diverters. As of June 2015, no proposal has been submitted by the proponent for consideration by the committee. Therefore, until such requirements are revised first by the ASME A112.18.1/CSA B125.1 Standard Committee, they have no business being addressed separately in an installation code or standard such as the 2017 WE-Stand.

EXPLANATION OF NEGATIVE:
HOFFMAN: Keep current language.
KOELLER: Agree with comments of Brent Mecham and Thomas Pape. Data already provided to the TC which was developed just from the California Energy Commission (CEC) database of August 12, 2015 shows there are 475 models of certified no-leak tub spout diverters available today in the U.S. marketplace. These models come from over 2 dozen different manufacturers.
This provision does nothing to prevent the marketplace continuing to function just as it does now throughout the U.S. It ONLY sets a more up-to-date and aggressive water-efficient threshold for those intending to utilize the WE-Stand document (identical to the situation created for many other water-efficient products).
Arguments have been made that there is no listing process available for these no-leak products, yet that is NOT the case. The CEC's database has existed since the standard was set by that organization 20 years ago. It is readily accessible from anywhere in the U.S., centralized (unlike for other plumbing products where listings are maintained by multiple different accredited certification bodies), easy to use, and fully capable of supporting the inquiries and actions needed by the authorities having jurisdiction, plumbers, contractors, engineers, design professionals, and members of the general public.
The arguments in opposition to no-leak TSDs offered by manufacturers are merely another roadblock intended to again thwart change and movement toward more water-efficient designs and practices.
KRAUSE: I agree with Mr. Pape and Mr. Koeller.
MAJEROWICZ: No-leak diverter valves exist then they should be used.
MANN: I concur with Tom Pape's statement. Over time diverter tub spouts leak. To be truly green, diverter spouts should not be allowed.
MECHAM: I concur with Tom Pape if no-leak diverter valves exist in the marketplace, they should be used.
PAPE: It is utter nonsense to argue for this change by stating the valve could leak at a later date. Virtually every fixture and fitting could (and often does) become less efficient over time. This standard is about building it right in the first place. Valve with zero leaks are readily available in the marketplace.
The proponents are brashly stating they want to design, manufacture, sell and install valves with leak inherent to the valve design. That might be legal, but it is definitely NOT water efficient and not appropriate in an ANSI Standard with "Water Efficiency" in its title.

COMMENT ON ABSTENTION:
DIGIOVANNI: Agree with posted negative comments.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (402.6.3) Item #033

Name:	Thomas Pape
Organization:	AWE
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	402.6.3

Proposed Text:	
Problem Statement:	It is nonsense to argue the valve could leak at a later date. Virtually every fixture and fitting could (and often does) become less efficient over time. This standard is about building it right in the first place. Valves with zero leaks are readily available in the marketplace. It is not appropriate to have a Water Efficiency Standard that allows NEW fixtures to leak, much less promote valves that are purposefully designed and manufactured to leak.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (402.6.3) Item # 033

Name:	John Koeller
Organization:	Koeller and Company
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	402.6.3
Proposed Text:	**402.6.3 Bath and Shower Diverters.** Tub spout bath and shower diverters, while operating in the shower mode, shall perform <u>with zero leakage</u> in accordance with ASME A112.18.1/CSA B125.1.
Problem Statement:	The reasons stated in the original proposal are still valid and convincing. Contrary to comments made by one commenter, this proposal has nothing to do with measuring leakage "in the field". The testing of the products continues to performed in accordance with the standard cited....nothing changes here. Identification of those 475 models that ALREADY COMPLY with the zero leakage requirement exists with the CEC, and can be formally 'listed' by IAPMO if that is the path chosen. Finally, the testing and listing of California Energy Commission-compliant diverters has been in place for over 20 years. It is time for application of California requirements and implementation of 'no leakage' requirements to the WE-Stand standard.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 3:

WE-Stand 2017 – (402.6.3) Item # 033

Name:	Edward Osann
Organization:	Natural Resources Defense Council
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	402.6.3

Proposed Text:	Revise text as follows: **402.6.3 Bath and Shower Diverters.** Tub spout bath and shower diverters~~, while operating in the shower mode,~~ shall comply ~~perform in accordance~~ with ASME A112.18.1/CSA B125.1, and shall be certified to the following rates of leakage when tested as provided therein: 1. Initial leakage rate test (sec. 5.3.6.1.2): zero gallons per minute (gpm). 2. Life cycle leakage rate test (sec. 5.6): 0.05 gpm.
Problem Statement:	If Item 033 were adopted as proposed, tub spout leakage would be accommodated at truly wasteful levels, due to reliance on inadequate performance levels in the current ASME standard. The standard allows leakage of 0.1 gpm in the initial test, and 0.2 gpm in a life cycle test of 15,000 repetitions. 0.1 gpm adds nearly a gallon of water waste to a typical shower event of close to 10 minutes, and nearly 2 gallons of waste if the full allowance of the life-cycle test is used. Instead, this modification by public comment would require products that have zero leakage in the initial test and 0.05 gpm in the life-cycle test, the latter of which is the standard that has been in place in California for nearly 20 years. Hundreds of models are commercially available today that would comply with these criteria. Contrary to Problem Statement, this section of WE-Stand has nothing to do with testing specific leakage levels "in the field". The testing and certification of these products will continue to be performed in accordance with the standard cited.
Referenced Standards:	

Name:	Matt Sigler
Organization:	PMI
Recommendation:	Delete text
Section Number:	402.6.4.1
Proposed Text:	~~**402.6.4.1** Control valves for showers and tubshower combinations shall be tagged, labeled, or marked with the manufacturer's minimum rated flow and such marking shall be visible after installation.~~
Problem Statement:	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. The proposed language was rejected by the UPC Technical Committee, because the proponent failed to provide any data or evidence that any such markings would improve upon the safety provisions already addressed within the code. .Such requirements for tags, labels, and markings are unnecessary as such info is generally available on the manufacturer's website for a consumer to reference. .Markings on escutcheons or other trim components are not possible in all applications as these parts are used on a multitude of different products. Based on research conducted by manufacturers, a great majority of consumers want a minimal number of markings on escutcheons or other trim components. Which means that any such temporary tag, label, or marking will most likely be removed by the consumer before a new showerhead is installed. .What does "shall be visible after installation" mean? Does that mean after the control valve is installed or after the finishing trim of the shower is installed? .How will such a tag, label, or marking be uniformly enforced in the field? What exactly should be stated on the tag, label, or marking? What size is the text? Who will install? Where should it be installed?
Referenced Standards:	

TC ACTION:
Reject

TC SUBSTANTIATION:
The marking/labeling provision is important to protect against scalding when considering aftermarket changes to the shower components, especially showerheads.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 22, NEGATIVE: 4, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
KRAUSE: I agree with Mr. Sigler and Mr. Mann.
MANN: I agree with Matt Sigler's comment. This is unenforceable. It would seem to me that the flow rate would be stamped on the face plate. Now, the homeowner changes the face plate and there goes the flow rate.
RAWALPINDIWALA: We agree with the original problem statement.
SIGLER: Based on my original reason statement, this code language is not enforceable and was introduced into the IAPMO Green Supplement without any technical data or evidence to support it. For

these reasons, the Uniform Plumbing Code (UPC) Technical Committee rejected it when proposed for the 2015 UPC.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (402.6.4.1) Item #034

Name:	Matt Sigler
Organization:	PMI
Recommendation:	Request to accept the code change proposal as submitted by this public comment.
Section Number:	402.6.4.1
Proposed Text:	
Problem Statement:	1. Based on my original reason statement, this code language is not enforceable and was introduced into the IAPMO Green Supplement without any technical data or evidence to support it. For these reasons, the Uniform Plumbing Code (UPC) Technical Committee rejected it when proposed for the UPC. 2. It should be noted that in Section 101.2 of the WE-Stand it states: "This standard is not intended to circumvent the health, safety and general welfare requirements of the codes referenced in Section 101.6." In Section 101.6.4, the UPC is referenced. Therefore, based on what is stated in Section 101.2 of the WE-Stand, how can this standard have marking requirements that conflict with those of the UPC?
Referenced Standards:	

WE-Stand 2017 – (408.1) Item # 046

Name:	Cambria McLeod
Organization:	Kohler
Recommendation:	Revise text
Section Number:	408.1
Proposed Text:	**408.1 General.** Where installed, leak detection and control devices shall comply with IAPMO IGC115. ~~Note: Leak detection and control devices help protect property from water damage and also conserve water by shutting off the flow when leaks are detected.~~
Problem Statement:	Unnecessary. This is analogous to having a note under water closets that states 1.28gpf water closets save more water than 1.6gpf water closets.
Referenced Standards:	IGC 115

Note: IAPMO Guide Criteria (IGC) 115 publication was not developed via an open process having a published development procedure in accordance with Section 15.2 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 25, NEGATIVE: 1, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
MANN: The devices should comply with a recognized ANSI Standard and not a guide.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (408.1) Item # 046

Name:	Michael Cudahy
Organization:	Plastic Pipe and Fittings Association
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	408.1
Proposed Text:	**408.1 General.** Where installed, leak detection and control devices shall comply with IAPMO IGC115. Leak detection and control devices shall not be installed where they isolate fire sprinkler systems. ~~Note: Leak detection and control devices help protect property from~~

	~~water damage and also conserve water by shutting off the flow when leaks are detected.~~
Problem Statement:	These devices should never be installed in a manner where they interfere with the operation of a fire sprinkler system in the case of a system activation. If they shut or reduce the flow of water to the sprinkler head it is a life safety issue.
Referenced Standards:	

Name:	Ron Wolfarth
Organization:	Rain Bird Corporation
Recommendation:	Revise text
Section Number:	414.1
Proposed Text:	**414.1 General.** Where landscape irrigation systems are installed, they shall ~~use low application irrigation methods and~~ comply with Sections 41~~3~~4.2 through 41~~3~~4.13. Requirements limiting the amount or type of plant material used in landscapes shall be established by the Authority Having Jurisdiction. **Exception:** Plants grown for food production.
Problem Statement:	Problem 1: Sprinklers with 'lower' precipitation (application) rates tend to be less efficient because they tend to produce a higher portion of small water droplets that are more easily blown off-target by slight wind and tend to more easily evaporate before hitting the ground. These smaller water droplets have less mass. Light wind easily moves these water droplets off target. The smaller surface to mass ratio of the small water droplets exposes more surface area to the air greatly increasing evaporative water losses. Substantiation for Problem 1: The reason a Precipitation Rate limit is proposed is to reduce runoff waste. Runoff is the problem, not high Precipitation Rates. Precipitation rate limits are not the best way or even a good way to reduce or eliminate runoff waste. Irrigation systems with 1 inch per hour Precipitation Rates apply water at a rate that far exceeds the Infiltration Rate of all non-manufactured soils. Therefore, runoff is not eliminated. Runoff will simply start a short time later compared to an irrigation system with, say, a 2.0 inch per hour Precipitation Rate. Cycle run times must be reduced in order to eliminate runoff and precipitation rate limits alone do not address this. It is a faulty notion that prohibiting higher Precipitation Rate (but perhaps highly efficient) sprinklers will conserve water. There are many, significant negative consequences to limiting precipitation rates. A) Wind Drift and Evaporation: Wind Drift and Evaporation are shown to be increased when using sprinklers with lower Precipitation Rates which tend to generate a greater proportion of smaller water droplets. The Science: In a study[1] conducted by University of Arizona and summarized in a White Paper by Randy Montgomery[2] and in a presentation by Randy Montgomery at the Irrigation Association Trade Show and Conference in 2013[3], it is shown that two spray sprinklers had very different performance in outdoor wind conditions despite having very similar performance in outdoor zero wind conditions. The more efficient sprinkler with a Precipitation Rate of 1.6 inches per hour applied 20% more of its water to the target area in a 5 mph wind compared to the sprinkler with a Precipitation Rate of 1.0 inch per hour. More Science: A study conducted by California State Polytechnic University, Pomona[4] found that 76 - 83% of runoff is due to wind, even at wind speeds of 0 - 5 mph. This study was performed with (low precipitation rate) multi-stream, multi-trajectory nozzles and (high precipitation rate) spray nozzles. B) Extended Run Times: Low Precipitation Rate systems will extend the schedule run time needed to apply the budgeted amount of water. This causes more of the irrigation to happen during worsening wind conditions. For example, in Los Angeles and San Diego, the ideal time to irrigate is between 5:00 and 6:00 AM when wind speed is approximately 1 - 2 mph.[5] The average daily wind speed in those areas is 5 mph or higher[6], the speed at which the low Precipitation Rate sprinkler in the University of Arizona study applied only about 63% of its water to the target area. The lower the Precipitation Rate limit imposed, the more irrigation will happen during windier, inefficient times. C) Restrictions on solutions for large turf areas: Many of the highly efficient, larger area turf sprinklers used to irrigate parks, schools, sports fields and golf courses would be eliminated from use. Many have

	Precipitation Rates higher than 1.0 inch per hour, especially when used in part circle operation. These rotors are the most efficient means of irrigating these spaces. Sprinklers in golf course playing surfaces would often have to be full-circle sprinklers located near the edge of the playing surface in order to provide adequate water to the turf. This would cause excessive overspray onto non-playing surfaces where it has less beneficial use. There is existing, affordable control technology on the market today from several manufacturers that eliminates runoff waste. A) The most effective solution to eliminating runoff waste is to break irrigation run times into short cycles that stop before runoff begins, pausing irrigation to allow water to soak in and then repeating the pattern until the irrigation requirement is met. There are products on the market today that accomplish this with no user intervention or change in user behavior. Section 414.5 of this proposed addresses the requirements for these control systems. B) The Science: The study conducted at California State Polytechnic University, Pomona[4] showed that using short cycles and soak times resulted in reducing runoff to about 0.25% of total water applied when using high and low precipitation rate sprinklers. In other words, 99.75% of the water applied did not runoff regardless of the sprinklers' Precipitation Rate when proper Irrigation Management was employed. This can be accomplished automatically with no user intervention or change in behavior. The low precipitation rate sprinklers used in the study were multi-stream, multi-trajectory nozzles and conventional, spray heads. Automation with Available Products: Irrigation controllers on the market today from several manufacturers allow the user to limit cycle time to eliminate runoff. The only expertise required is during the installation and set-up time. This level of expertise is reasonable to expect. Products can be chosen that require no change in end-user behavior. Conclusions: 1) Lower Precipitation Rates will only delay the start of runoff and not eliminate it because no soil aside from manufactured putting greens and manufactured sports fields can absorb water at the rate of 1.0 inch per hour. 2) Imposing Precipitation Rate limits ignores the very significant water waste due to Wind Drift and Evaporation losses that tend to increase as Precipitation Rate is lowered. 3) Even low Precipitation Rate sprinklers require management via the controller to eliminate runoff due to the infiltration rate of the soil, so why deny irrigators the right to use the most efficient irrigation solutions possible? The benefits of a Precipitation Rate limit are greatly over-shadowed by the negative consequences. 4) Irrigation Management strategies have been shown in university research to completely eliminate runoff regardless of the Precipitation Rate of the sprinklers used. 5) Products on the market today make the employment of Irrigation Management strategies that completely eliminate runoff easy for the end-user and require only reasonable expertise on the part of the installer. The proposed standard requires a "Smart Controller." Adding a requirement that it allow the user to set a maximum cycle time per zone as suggested above would solve the problem of runoff. 6) Science supports these conclusions. 7) Do not settle for a partial, weak, ineffective measure to only reduce runoff while harming irrigation water efficiency. Provided for reference: Notes: [1] Assessment of Application Efficiency and Uniformity of Fixed Spray and Multi-Stream Report Apr 2013 Brown Gilbert [2] Wind Effects on Sprinkler Irrigation Performance Manuscript -Randy Montgomery [3] Lets take it outside - Randy Montgomery IA 2013 Presentation [4] Effect of Nozzles and Cycle and Soak Scheduling on Landscape Irrigation Efficiency- Kumar-Vis [5] https://weatherspark.com [6] http://www.ncdc.noaa.gov/sites/default/files/attachments/wind1996.pdf
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 23, NEGATIVE 3, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
KRAUSE: Due to action taken on #49.
MANN: The use of high efficient spray heads is preferred.
PAPE: Removing the requirement is not an acceptable option as it allows for devices that are known to make water waste easier. The studies cited were not properly designed to illuminate the advantages of rotating stream heads. The proponent should have requested the maximum precipitation rate be raised rather than eliminated.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (414.1) Item #050

Name:	Thomas Pape
Organization:	AWE / BMP
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	414.1
Proposed Text:	
Problem Statement:	Low application rate systems make it more difficult for over irrigation and run-off and over-spray. Rotating stream head irrigation equipment can apply the water at an efficient rate without loss due to evaporation or wind shift. A Water Efficiency standard should include the premise of low application methods and materials as a basis of its requirements.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (414.1) Item #050

Name:	Ron Wolfarth
Organization:	Rain Bird Corporation
Recommendation:	Request to accept the code change proposal as submitted by this public comment.
Section Number:	414.1
Proposed Text:	No change. Rain Bird supports the proposed text as previously amended by the committee.
Problem Statement:	No change. Rain Bird supports the proposed text as previously accepted by the committee.
Referenced Standards:	

WE-Stand 2017 – (414.5 – 414.5.7) Item # 054

Name:	Brent Mecham
Organization:	Irrigation Association
Recommendation:	Revise text
Section Number:	414.5-414.5.7
Proposed Text:	**414.5 Irrigation Control Systems.** Where installed as part of a landscape irrigation system, irrigation control systems shall: **414.5.1** Automatically adjust the irrigation schedule to respond to plant water needs determined by weather or soil moisture conditions. **414.5.2** Utilize on-site sensors to inhibit or suspend irrigation <u>when adequate soil moisture is present or</u> during ~~a~~ rainfall or freezing conditions. (sections 414.5.3 through 414.5.6 remain unchanged) **414.5.7** The site specific settings of the irrigation control system ~~affecting the irrigation and~~ shall be posted at the control system location. 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 <u>type and</u> ~~absorption~~ <u>basic</u> <u>intake</u> 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 <u>change from peak demand schedule</u>.
Problem Statement:	Minor edits to add clarity to existing language.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 26, NOT RETURNED: 2 Gray, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (414.5 – 414.5.7) Item # 054

Name:	Robert Pickering
Organization:	Eastern Research Group, Inc.
Representing:	EPA WaterSense
Recommendation:	Request to accept the code change proposal as modified by this public comment

Section Number:	414.5-414.5.7
Proposed Text:	**414.5 Irrigation Control Systems.** Where installed as part of a landscape irrigation system, irrigation control systems shall: **414.5.1** <u>Utilize either one or more on-site sensors that automatically adjust the irrigation schedule to respond to plant water needs determined by soil moisture conditions or an WaterSense labeled weather-based irrigation controller.</u> ~~Automatically adjust the irrigation schedule to respond to plant water needs determined by weather or soil moisture conditions.~~ **414.5.2** Utilize on-site sensors to inhibit or suspend irrigation <u>when adequate soil moisture is present or</u> during ~~a~~ rainfall or freezing conditions. ~~**414.5.3** 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.~~ (sections 414.5.~~3~~<u>4</u> through 414.5.6 remain unchanged) **414.5.7** The site specific settings of the irrigation control system ~~affecting the irrigation and~~ shall be posted at the control system location. 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 <u>type and</u> ~~absorption~~ <u>basic intake</u> 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 <u>change from peak demand schedule</u>.
Problem Statement:	The language in this section is not clear. EPA suggests that the standard require either WaterSense labeled weather-based irrigation controllers or soil moisture based control technologies with certain features. Note that WaterSense is developing a specification for soil moisture based control technologies and will add this product to its list of labeled products when a final specification is developed. In addition, Sections 414.5.1 and 414.5.3 seem duplicative.
Referenced Standards:	

WE-Stand 2017 – (414.9) Item # 056

Name:	Ron Wolfarth
Organization:	Rain Bird Corporation
Recommendation:	Revise text
Section Number:	414.9
Proposed Text:	**414.9 Narrow or Irregularly Shaped Landscape Areas.** Narrow or irregularly shaped landscape areas, less than 4 feet (1219 mm) in any direction across any opposing boundaries shall not be irrigated by any irrigation emission device except <u>sub-surface or</u> low flow emitters.
Problem Statement:	The purpose of the restriction on the type of irrigation emitter used in narrow and irregularly shaped landscape areas is to reduce or eliminate over-spray and runoff. Sub-surface irrigation emitters accomplish this purpose regardless of their flow rate. Requiring that sub-surface irrigation emitters also have low flow rates is an unnecessary restriction that makes no contribution to water efficiency.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 26, NOT RETURNED: 2 Gray, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (414.9) Item # 056

Name:	Ron Wolfarth
Organization:	Rain Bird Corporation
Recommendation:	Request to accept the code change proposal as submitted by this public comment
Section Number:	414.9
Proposed Text:	No change. Rain Bird supports the proposed text as previously amended by the committee.
Problem Statement:	No change. Rain Bird supports the proposed text as previously amended by the committee.
Referenced Standards:	

Name:	Kelsey Jacquard
Organization:	Hunter Industries
Recommendation:	Revise text
Section Number:	414.10
Proposed Text:	**414.10 Sloped Areas.** Where soil surface rises more than 1 foot (305 mm) per 4 feet (1219 mm) of length, the irrigation zone system shall not allow irrigation water to run out of the irrigation zone. ~~average precipitation rate shall not exceed 0.75 inches (19 mm) per hour as verified through either of the following methods.~~ ~~(a) manufacturer documentation that the precipitation rate for the installed sprinkler head does not exceed 0.75 inches (19 mm) per hour where the sprinkler heads are installed no closer than the specified radius and where the water pressure of the irrigation system is no greater than the manufacturer's recommendations.~~ ~~(b) catch can testing in accordance with the requirements of the Authority Having Jurisdiction and where emitted water volume is measured with a minimum of 6 catchment containers at random places within the irrigation zone for a minimum of 15 minutes to determine the average precipitation rate, expressed as inches per hour.~~
Problem Statement:	It is recommended to eliminate the precipitation rate requirement and instead require the absence of any runoff through proper scheduling. Drip products can have a precipitation rate greater than 0.75 in/hr or even 1.0 in/hr depending on the emitter spacing and emitter flow.
Referenced Standards:	

TC ACTION:
Reject

TC SUBSTANTIATION:
The committee prefers the action taken on item #055. The proposed text is considered to be unenforceable.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 26, NOT RETURNED: 2 Gray, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (414.10) Item # 057

Name:	Ron Wolfarth
Organization:	Rain Bird Corporation
Recommendation:	Request to accept the code change proposal as modified by this public comment.

Section Number:	414.10
Proposed Text:	~~414.10 Sloped Areas. Where soil surface rises more than 1 foot (305 mm) per 4 feet (1219 mm) of length, the irrigation zone system average precipitation rate shall not exceed 0.75 inches (19 mm) per hour as verified through either of the following methods:~~ ~~(a) manufacturer documentation that the precipitation rate for the installed sprinkler head does not exceed 0.75 inches (19 mm) per hour where the sprinkler heads are installed no closer than the specified radius and where the water pressure of the irrigation system is no greater than the manufacturer's recommendations.~~ ~~(b) catch can testing in accordance with the requirements of the Authority Having Jurisdiction and where emitted water volume is measured with a minimum of 6 catchment containers at random places within the irrigation zone for a minimum of 15 minutes to determine the average precipitation rate, expressed as inches per hour.~~ **414.10 Irrigation System Inspection and Performance Check** The irrigation system shall be inspected to verify compliance with the irrigation design. **414.10.1** Inspection and performance check shall be by an independent third party having credentials in accordance with the US EPA WaterSense program or the Authority Having Jurisdiction. **414.10.2** Sprinklers shall be installed as specified with proper spacing and required nozzle. **414.10.3** Sprinklers shall be activated and visually inspected for covering areas without causing overspray or runoff. **414.10.4** Valves shall be installed as specified. **414.10.5** Drip irrigation systems shall be inspected to verify the proper valve, pressure regulation, filtering device, location of flush valves, and that the installed emitters comply with the irrigation plan. **414.10.6** Control system shall be installed as specified and include a US EPA WaterSense labeled controller, and all sensors shall be installed and verified for proper operation. **414.10.7** The peak demand irrigation schedule shall be posted near the controller, or the scheduling parameters for the controller shall be listed for each station including cycle and soak times. **414.10.8** Record drawings of the irrigation system shall be completed and provided for the irrigation inspection. **414.10.9** An inspection report shall be provided to the property owner or management company identifying problems and what corrective actions are required.
Problem Statement:	Problem: Precipitation rate limits are not an effective way to reduce or eliminate runoff waste. Runoff is the problem, not high Precipitation Rates. In fact, lower precipitation rates can increase water losses more than savings from lower precipitation rates due to wind drift and evaporation. The most effective solution to eliminating runoff waste is to breakdown irrigation Run Times into Short Cycles that stop before runoff begins and waits for water to soak into the ground before starting another cycle. Substantiation for the Problem: Proof that wind drift and evaporation of lower precipitation rate sprinklers cause significant water waste is found in the Univ. of Arizona, "Assessment of Application Efficiency and Uniformity of Fixed Spray and Multi-Stream Report Apr 2013 Brown Gilbert" study. Proof that run-off can be eliminated with "cycle and soak" programming of controllers is found in Cal Poly "Effect_of_Nozzles_and_Cycle_and_Soak_Scheduling_on_Landscape_Irrigation_Efficiency-Kumar-Vis" study. (Both of these studies have been uploaded.) The elimination of run-off can be accomplished without setting a precipitation rate limit and without increasing other water losses that may be greater than any savings from lower precipitation rates.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (414.10) Item # 057

Name:	Robert Pickering
Organization:	Eastern Research Group, Inc.
Representing:	EPA WaterSense
Recommendation:	No recommendation. Only Comment.
Section Number:	414.10
Proposed Text:	
Problem Statement:	EPA WaterSense is interested in reviewing references or evidence for the requirements in Section 414.10 (Sloped Areas). How was a criteria of 0.75 inches/hr selected? This rate may still result in runoff based on soil infiltration rates.
Referenced Standards:	

WE-Stand 2017 – (414.11, 414.11.3) Item # 060

Name:	Brent Mecham
Organization:	Irrigation Association
Recommendation:	Revise text
Section Number:	414.11, 414.11.3
Proposed Text:	**414.11 Sprinkler Head Installations.** All installed sprinkler heads shall ~~be low precipitation rate sprinkler heads~~ comply with ASABE/ICC 802. (414.11.1-414.11.2 remain unchanged) **414.11.3 Pop-up Type Sprinkler Heads.** Where pop-up type sprinkler heads are installed, the sprinkler heads shall pop-up to a height above vegetation level and of not less than 4 inches (102 mm) above the soil level when emitting water. ~~Sprinkler heads shall comply with the requirements of standard ASABE/ICC 802-2014.~~
Problem Statement:	List the applicable standard at the beginning of the section rather than at the end like an afterthought. Strike the wording of low precipitation rate sprinklers heads because the arbitrary precipitation rate in the definitions has no scientific justification. Scheduling and management are what improves water use efficiency. Referenced standard is already within the document and has been previously reviewed by IAPMO.
Referenced Standards:	ASABE/ICC 802

Note: ASABE/ICC 802 meets the requirements for a mandatory reference standard in accordance with Section 15.0 of Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 26, NOT RETURNED: 2 Gray, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (414.11, 414.11.3) Item # 060

Name:	Robert Pickering
Organization:	Eastern Research Group, Inc.
Representing:	EPA WaterSense
Recommendation:	Request to accept the code change proposal as modified by this public comment.

Section Number:	414.11.2
Proposed Text:	**414.11 Sprinkler Head Installations.** All installed sprinkler heads shall comply with ASABE/ICC 802. (414.11.1-~~414.11.2~~ remain unchanged) **414.11.2 Sprinkler Body Pressure Regulation.** Sprinkler bodies shall <u>be certified to meet the criteria established in the EPA WaterSense Specification for Spray Sprinkler Bodies.</u> ~~utilize pressure regulating devices (as part of irrigation system or integral to the sprinkler head) to maintain manufacturer's recommended operating pressure for each sprinkler and nozzle type.~~ **414.11.3 Pop-up Type Sprinkler Heads.** Where pop-up type sprinkler heads are installed, the sprinkler heads shall pop-up to a height above vegetation level and of not less than 4 inches (102 mm) above the soil level when emitting water.
Problem Statement:	Depending the timing for finalizing this standard, it should reference WaterSense labeled spray sprinkler bodies. WaterSense aims to have a final specification for spray sprinkler bodies with integral pressure regulation in summer 2017.
Referenced Standards:	WaterSense Draft Specification for Spray Sprinkler Bodies

WE-Stand 2017 – (414.11.1) Item # 062

Name:	Kelsey Jacquard
Organization:	Hunter Industries
Recommendation:	Revise text
Section Number:	414.11.1
Proposed Text:	**414.11.1 Sprinkler Heads in Common Irrigation Zones.** Sprinkler heads installed in irrigation zones served by a common valve shall be limited to applying water to plants with similar irrigation needs~~, and shall have matched precipitation rates (identical inches of water application per hour as rated or tested, plus or minus 5 percent)~~.
Problem Statement:	It is recommended to remove the requirement of matched precipitation rate since it would be limiting to irrigation designs. Otherwise, please clarify the requirement of matched precipitation. Is the precipitation rate of the zone checked after installation using catch devices, or is it based on manufacturer data? Also, a tolerance of plus or minus 5% is very tight. A product with an application rate of .4 in/hr would be allowed a range of 0.38 - 0.42 in/hr, which may be difficult to measure and maintain.
Referenced Standards:	

TC ACTION:
Reject

TC SUBSTANTITATION:
Current language is preferred. Provision is important to maintain.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 26, NOT RETURNED: 2 Gray, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (414.11.1) Item # 062

Name:	Robert Pickering
Organization:	Eastern Research Group, Inc.
Representing:	EPA WaterSense
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	414.11.1

Proposed Text:	**414.11.1 Sprinkler Heads ~~in Common Irrigation Zones~~ <u>by Hydrozone</u>.** Sprinkler heads installed in irrigation zones served by a common valve shall be limited to applying water to plants with similar irrigation needs, and shall have matched precipitation rates (identical inches of water application per hour as rated or tested, plus or minus 5 percent).
Problem Statement:	Use the term "hydrozone" as done in other parts of the standard to describe "Sprinkler Heads in Common Irrigation Zones." Hydrozone definition is already included in Section 210.0.
Referenced Standards:	

WE-Stand 2017 – (414.11.1) Item # 063

Name:	Ron Wolfarth
Organization:	Rain Bird Corporation
Recommendation:	Revise text
Section Number:	414.11.1
Proposed Text:	**414.11.1 Sprinkler Heads in Common Irrigation Zones.** Sprinkler heads installed in irrigation zones served by a common valve shall be limited to applying water to plants with similar irrigation needs, and shall have matched precipitation rates (identical inches of water application per hour as rated or tested, plus or minus ~~5~~20 percent).
Problem Statement:	The state of the art in plastic molding injection, manufacturing assembly, and in the measurement of sprinkler performance is not adequate to achieve performance within the stated range.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 23, NEGATIVE: 3, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
HOFFMAN: The proponent's proposal is based on misunderstanding the pre-existing code language. The heads need only be rated within 5%, testing is not required. The proposed change would allow installer to build a system with substantial uniformity deficiencies.
KRAUSE: Based on written negative comments, I am concerned with the proposal.
PAPE: The proponent's proposal is based on misunderstanding the pre-existing code language. The heads need only be rated within 5%, testing is not required. The proposed change would allow installer to build a system with substantial uniformity deficiencies. Understand the math of "+ or - 20%: This will allow a head with .80"/hr. head to be on the same station as a 1.20"/hr. head equating to a 67% difference in the amount of water applied to the same plant material.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (414.11.1) Item #063

Name:	Thomas Pape
Organization:	AWE / BMP
Recommendation:	Request to reject the code change proposal by this public comment.

Section Number:	414.11.1
Proposed Text:	
Problem Statement:	Understand the math of "+ or - 20%: This will allow a head with .80"/hr. head to be on the same station as a 1.20"/hr. head equating to a 67% difference in the amount of water applied to the same plant material. This results in a wholly unacceptable irrigation uniformity - forcing the operator to over-irrigate a significant portion of the landscape (the "+20%) to meet the minimum water requirements of the "-20%" portion of the landscape
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (414.11.1) Item # 063

Name:	Ron Wolfarth
Organization:	Rain Bird Corporation
Recommendation:	Request to accept the code change proposal as submitted by this public comment.
Section Number:	414.11.1
Proposed Text:	No change. Rain Bird supports the proposed text as previously amended by the committee.
Problem Statement:	No change. Rain Bird supports the proposed text as previously amended by the committee.
Referenced Standards:	

WE-Stand 2017 – (414.11.3) Item # 064

Name:	Kelsey Jacquard
Organization:	Hunter Industries
Recommendation:	Delete text
Section Number:	414.11.3
Proposed Text:	**414.11.3 Pop-up Type Sprinkler Heads.** Where pop-up type sprinkler heads are installed, the sprinkler heads shall pop-up to a height above vegetation level ~~and of not less than 4 inches (102 mm) above the soil level when emitting water~~. Sprinkler heads shall comply with the requirements of standard ASABE/ICC 802-2014
Problem Statement:	It is recommended for the sprinkler heads to clear the vegetation without setting a height limit. Vegetation can vary in height, and products exist for all ranges.
Referenced Standards:	ASABE/ICC 802

Note: ASABE/ICC 802 meets the requirements for a mandatory reference standard in accordance with Section 15.0 of Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

TC ACTION:
Reject

TC SUBSTANTIATION:
The committee feels that the proposed deleted text provides important criteria to maintain.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 26, NOT RETURNED: 2 Gray, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (414.11.3) Item # 064

Name:	Robert Pickering
Organization:	Eastern Research Group, Inc.
Representing:	EPA WaterSense
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	414.11.3

Proposed Text:	**414.11.3 Pop-up Type Sprinkler Heads.** Where pop-up type sprinkler heads are installed, the sprinkler heads shall pop-up to a height above vegetation level and of not less than 4 inches (102 mm) above the soil level when emitting water. Sprinkler heads shall comply with the requirements in Section 302 and 304 of standard ASABE/ICC 802-2014.
Problem Statement:	The draft standard requires that all "pop-up type sprinkler heads" comply with the requirements of ASABE/ICC 802-2014. We support use of consensus based standards, but the test methods in the standard have not yet been validated. During the development of the WaterSense Draft Specification for Spray Sprinkler Bodies, WaterSense attempted to use the method in the standard for pressure-regulation. While the basis of the test method is valid and adopted by WaterSense, additional clarification was needed and other revisions were required to lend repeatable results. All test methods in the standard should go through this type of validation prior to the standard being referenced. Additionally, WaterSense isn't aware of any products that are currently certified to this standard. For more information on our experience with the pressure regulation test method validation, please see the WaterSense Draft Specification for Spray Sprinkler Bodies Supporting Statement www.epa.gov/watersense/products/docs/sprinker_body_draft_spec_supporting_statement_508.pdf).
Referenced Standards:	

Name:	Ron Wolfarth
Organization:	Rain Bird Corporation
Recommendation:	Delete text
Section Number:	414.12
Proposed Text:	~~**414.12 Irrigation Zone Performance Criteria.** Irrigation zones shall be designed and installed to ensure the average precipitation rate of the sprinkler heads over the irrigated area does not exceed 1.0 inch per hour as verified through either of the following methods:~~ ~~(a) manufacturer's documentation that the precipitation rate for the installed sprinkler head does not exceed 1.0 inches per hour where the sprinkler heads are installed no closer that the specified radius and where the water pressure of the irrigation system is no greater than the manufacturer's recommendations.~~ ~~(b) catch can testing in accordance with the requirements of the Authority Having Jurisdiction and where emitted water volume is measured with a minimum of 6 catchment containers at random places within the irrigation zone for a minimum of 15 minutes to determine the average precipitation rate, expressed as inches per hour.~~ (renumber remaining sections)
Problem Statement:	Problem 1: Sprinklers with 'lower' precipitation (application) rates tend to be less efficient because they tend to produce a higher portion of small water droplets that are more easily blown off-target by slight wind and tend to more easily evaporate before hitting the ground. These smaller water droplets have less mass. Light wind easily moves these water droplets off target. The smaller surface to mass ratio of the small water droplets exposes more surface area to the air greatly increasing evaporative water losses. Substantiation for Problem 1: The reason a Precipitation Rate limit is proposed is to reduce runoff waste. Runoff is the problem, not high Precipitation Rates. Precipitation rate limits are not the best way or even a good way to reduce or eliminate runoff waste. Irrigation systems with 1 inch per hour Precipitation Rates apply water at a rate that far exceeds the Infiltration Rate of all non-manufactured soils. Therefore, runoff is not eliminated. Runoff will simply start a short time later compared to an irrigation system with, say, a 2.0 inch per hour Precipitation Rate. Cycle run times must be reduced in order to eliminate runoff and precipitation rate limits alone do not address this. It is a faulty notion that prohibiting higher Precipitation Rate (but perhaps highly efficient) sprinklers will conserve water. There are many, significant negative consequences to limiting precipitation rates. A) Wind Drift and Evaporation: Wind Drift and Evaporation are shown to be increased when using sprinklers with lower Precipitation Rates which tend to generate a greater proportion of smaller water droplets. The Science: In a study[1] conducted by University of Arizona and summarized in a White Paper by Randy Montgomery[2] and in a presentation by Randy Montgomery at the Irrigation Association Trade Show and Conference in 2013[3], it is shown that two spray sprinklers had very different performance in outdoor wind conditions despite having very similar performance in outdoor zero wind conditions. The more efficient sprinkler with a Precipitation Rate of 1.6 inches per hour applied 20% more of its water to the target area in a 5 mph wind compared to the sprinkler with a Precipitation Rate of 1.0 inch per hour. More Science: A study conducted by California State Polytechnic University, Pomona[4] found that 76 - 83% of runoff is due to wind, even at wind speeds of 0 - 5 mph. This study was performed with (low precipitation rate) multi-stream, multi-trajectory nozzles and (high precipitation rate) spray nozzles. B) Extended Run Times: Low Precipitation Rate systems will extend the schedule

run time needed to apply the budgeted amount of water. This causes more of the irrigation to happen during worsening wind conditions. For example, in Los Angeles and San Diego, the ideal time to irrigate is between 5:00 and 6:00 AM when wind speed is approximately 1 - 2 mph.[5] The average daily wind speed in those areas is 5 mph or higher[6], the speed at which the low Precipitation Rate sprinkler in the University of Arizona study applied only about 63% of its water to the target area. The lower the Precipitation Rate limit imposed, the more irrigation will happen during windier, inefficient times. C) Restrictions on solutions for large turf areas: Many of the highly efficient, larger area turf sprinklers used to irrigate parks, schools, sports fields and golf courses would be eliminated from use. Many have Precipitation Rates higher than 1.0 inch per hour, especially when used in part circle operation. These rotors are the most efficient means of irrigating these spaces. Sprinklers in golf course playing surfaces would often have to be full-circle sprinklers located near the edge of the playing surface in order to provide adequate water to the turf. This would cause excessive overspray onto non-playing surfaces where it has less beneficial use. There is existing, affordable control technology on the market today from several manufacturers that eliminates runoff waste. A) The most effective solution to eliminating runoff waste is to break irrigation run times into short cycles that stop before runoff begins, pausing irrigation to allow water to soak in and then repeating the pattern until the irrigation requirement is met. There are products on the market today that accomplish this with no user intervention or change in user behavior. Section 414.5 of this proposed addresses the requirements for these control systems. B) The Science: The study conducted at California State Polytechnic University, Pomona[4] showed that using short cycles and soak times resulted in reducing runoff to about 0.25% of total water applied when using high and low precipitation rate sprinklers. In other words, 99.75% of the water applied did not runoff regardless of the sprinklers' Precipitation Rate when proper Irrigation Management was employed. This can be accomplished automatically with no user intervention or change in behavior. The low precipitation rate sprinklers used in the study were multi-stream, multi-trajectory nozzles and conventional, spray heads. Automation with Available Products: Irrigation controllers on the market today from several manufacturers allow the user to limit cycle time to eliminate runoff. The only expertise required is during the installation and set-up time. This level of expertise is reasonable to expect. Products can be chosen that require no change in end-user behavior. Conclusions: 1) Lower Precipitation Rates will only delay the start of runoff and not eliminate it because no soil aside from manufactured putting greens and manufactured sports fields can absorb water at the rate of 1.0 inch per hour. 2) Imposing Precipitation Rate limits ignores the very significant water waste due to Wind Drift and Evaporation losses that tend to increase as Precipitation Rate is lowered. 3) Even low Precipitation Rate sprinklers require management via the controller to eliminate runoff due to the infiltration rate of the soil, so why deny irrigators the right to use the most efficient irrigation solutions possible? The benefits of a Precipitation Rate limit are greatly over-shadowed by the negative consequences. 4) Irrigation Management strategies have been shown in university research to completely eliminate runoff regardless of the Precipitation Rate of the sprinklers used. 5) Products on the market today make the employment of Irrigation Management strategies that completely eliminate runoff easy for the end-user and require only reasonable expertise on the part of the installer. The proposed standard requires a "Smart Controller." Adding a requirement that it allow the user to set a maximum cycle time per zone as suggested above would solve the problem of runoff. 6) Science supports these conclusions. 7) Do not settle for a partial, weak, ineffective measure to only reduce runoff while harming irrigation water efficiency.

Provided for reference:
Notes: [1] Assessment of Application Efficiency and Uniformity of Fixed Spray and Multi-Stream Report Apr 2013 Brown Gilbert
[2] Wind Effects on Sprinkler Irrigation Performance Manuscript -Randy Montgomery
[3] Lets take it outside - Randy Montgomery IA 2013 Presentation

	[4] Effect of Nozzles and Cycle and Soak Scheduling on Landscape Irrigation Efficiency-Kumar-Vis [5] https://weatherspark.com [6] http://www.ncdc.noaa.gov/sites/default/files/attachments/wind1996.pdf
Referenced Standards:	

TC ACTION:
Reject

TC SUBSTANTIATION:
Text is not appropriate for deletion at this time.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 26, NOT RETURNED: 2 Gray, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (414.12) Item # 067

Name:	Ron Wolfarth
Organization:	Rain Bird Corporation
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	414.12
Proposed Text:	**414.12 ~~Irrigation Zone Performance Criteria.~~ Irrigation System Inspection and Performance Check** ~~Irrigation zones shall be designed and installed to ensure the average precipitation rate of the sprinkler heads over the irrigated area does not exceed 1.0 inch per hour as verified through either of the following methods:~~ ~~(a) manufacturer's documentation that the precipitation rate for the installed sprinkler head does not exceed 1.0 inches per hour where the sprinkler heads are installed no closer that the specified radius and where the water pressure of the irrigation system is no greater than the manufacturer's recommendations.~~ ~~(b) catch can testing in accordance with the requirements of the Authority Having Jurisdiction and where emitted water volume is measured with a minimum of 6 catchment containers at random places within the irrigation zone for a minimum of 15 minutes to determine the average precipitation rate, expressed as inches per hour.~~ The irrigation system shall be inspected by the Authority Having Jurisdiction or by an independent third party having credentials in accordance with the US EPA WaterSense program. The performance check shall determine compliance with the irrigation design by verifying the following: (1) Sprinklers shall be installed as specified with the proper spacing and required nozzle. (2) Sprinklers shall be activated and visually inspected for covering areas without causing overspray or runoff. (3) Valves shall be installed as specified.

	(4) Drip irrigation systems shall have the proper valve, pressure regulation, filtering device, location of flush valves, and that the installed emitters comply with the irrigation plan. (5) Control system shall be installed as specified and include a US EPA WaterSense labeled controller, and all sensors shall be installed and verified for proper operation. (6) The peak demand irrigation schedule shall be posted near the controller, or the scheduling parameters for the controller shall be listed for each station including cycle and soak times. (7) Record drawings of the irrigation system shall be completed and provided for the irrigation inspection. (8) An inspection report shall be provided to the property owner or management company identifying problems and what corrective actions are required.
Problem Statement:	This text exactly replicates the change proposed and accepted by the Task Group led by Brent Mecham. Rain Bird supports the proposed change. Problem: Precipitation rate limits are not an effective way to reduce or eliminate runoff waste. Runoff is the problem, not high Precipitation Rates. In fact, lower precipitation rates can increase water losses more than savings from lower precipitation rates due to wind drift and evaporation. The most effective solution to eliminating runoff waste is to breakdown irrigation Run Times into Short Cycles that stop before runoff begins and waits for water to soak into the ground before starting another cycle. Substantiation for the Problem: Proof that wind drift and evaporation of lower precipitation rate sprinklers cause significant water waste is found in the Univ. of Arizona, "Assessment of Application Efficiency and Uniformity of Fixed Spray and Multi-Stream Report Apr 2013 Brown Gilbert" study. Proof that run-off can be eliminated with "cycle and soak" programming of controllers is found in Cal Poly "Effect_of_Nozzles_and_Cycle_and_Soak_Scheduling_on_Landscape_Irrigation_Efficiency-Kumar-Vis" study. (Both of these studies have been uploaded.) The elimination of run-off can be accomplished without setting a precipitation rate limit and without increasing other water losses that may be greater than any savings from lower precipitation rates.
Referenced Standards:	

WE-Stand 2017 – (501.2) Item # 086

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	501.2
Proposed Text:	**501.2 System Design.** Alternative water source systems shall be designed in accordance with this chapter by a <u>licensed contractor or designer</u>, ~~person registered or licensed to perform plumbing design work or~~ who demonstrates competency to design the alternate water source system as required by the Authority Having Jurisdiction. Components, piping, and fittings used in any alternate water source system shall be listed.
Problem Statement:	Rational: These systems are often designed by engineers, or landscape contractors, or architects. Plumbing contractors are less knowledge about the irrigation portion of the system and so should not be called out as a preferred designer.
Referenced Standards:	

TC ACTION:
Accept as amended:

501.2 System Design. Alternative water source systems shall be designed in accordance with this chapter by a ~~licensed contractor or designer~~ <u>registered design professional or a person</u>, who demonstrates competency to design the alternate water source system as required by the Authority Having Jurisdiction. Components, piping, and fittings used in any alternate water source system shall be listed.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 22, NEGATIVE: 4, NOT RETURNED: 2 Gray, Tabakh

COMMENT ON AFFIRMATIVE:
KRAUSE: I support the modification. It is not so important that someone be licensed, but more important that they demonstrate competency in designing these systems.

EXPLANATION OF NEGATIVE:
MAJEROWICZ: A license plumber should be able to design these systems.
MANN: One of the only people qualified is a plumbing contractor.
PAPE: Not listing the licensed contractor in the paragraph is a mistake. The licensed contractor is NOT the only competent installer, but certainly the most obvious qualified person to do the work.
RAWALPINDIWALA: Prefer the original language.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (501.2) Item #086

Name:	Thomas Pape

Organization:	AWE / BMP
Recommendation:	Request to accept the code change proposal as modified by this public comment
Section Number:	501.2
Proposed Text:	**501.2 System Design**. Alternative water source systems shall be designed in accordance with this chapter by a licensed contractor or designer, registered design professional or a person, who demonstrates competency to design the alternate water source system as required by the Authority Having Jurisdiction. Components, piping, and fittings used in any alternate water source system shall be listed.
Problem Statement:	Not listing the licensed contractor in the paragraph is a mistake. The licensed contractor is not the only competent installer, but certainly the most obvious qualified person to do the work.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (501.2) Item # 086

Name:	Michael Cudahy
Organization:	Plastic Pipe and Fittings Association
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	501.2
Proposed Text:	**501.2 System Design**. Alternative water source systems shall be designed in accordance with this chapter by a licensed contractor, registered design professional or a person who demonstrates competency to design the alternate water source system as required by the Authority Having Jurisdiction. Components, piping, and fittings used in any alternate water source system shall be listed.
Problem Statement:	The TC amendment was good, but we offer to put back the licensed contractor.
Referenced Standards:	

WE-Stand 2017 – (501.3) Item # 087

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	501.3
Proposed Text:	**501.3 Permit.** It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any alternative water source system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction. <u>**Exception:** A construction permit shall not be required for a clothes washer only system meeting the requirements of Section 501.3.1</u>
Problem Statement:	Clothes washer only systems that do not alter the existing plumbing (and follow basic health and safety guidelines) are extremely low risk and should be allowed to be installed with no permit. California has had great success with this code and there are many incentive programs across the state for the clothes washer graywater system due to its permit-exempt status. Chapter 16 from the CPC is provided for reference.
Referenced Standards:	

TC ACTION:
Accept as amended:

501.3 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any alternative water source system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.
Exception: <u>For single family dwellings</u> ~~A~~ <u>a</u> construction permit shall not be required for a clothes washer only system meeting the requirements of Section 501.3.1.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 24, NEGATIVE: 2, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
MAJEROWICZ: Same as Dave [Mann], systems need to be inspected
MANN: There should always be a required permit. This is not protecting the health and safety of the pubic.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (501.3) Item #087

Name:	Cambria McLeod
Organization:	Kohler Co

Recommendation:	Request to reject the code change proposal and the TC amendment by this public comment.
Section Number:	501.3
Proposed Text:	
Problem Statement:	The provisions from Section 502.0 in WE-Stand are applicable to a gray water clothes washer system and therefore permits should be required in order to protect the health and safety of the public.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (501.3) Item # 088

Name:	John Koeller
Organization:	Koeller and Company
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	501.3.1
Proposed Text:	
Problem Statement:	All 13 subsections of Item 088 are unenforceable without a construction permit and therefore are unnecessary to be listed in the standard. If the intent is to exempt gray water clothes washer systems from permit, then the language in Item 087 is sufficient provided reference to the new Section 501.3.1 is stricken, and the term gray water should be added to clothes washer system. However, the provisions enumerated reveal the need for permit and inspection, especially when all the provisions from Section 502.0 in WE-Stand are applicable to a gray water clothes washer system. Without a permit, this installation can pose a risk for health and safety. If clothes washers are exempt, then why not lavatories and showers from single family homes?
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 3:

WE-Stand 2017 – (501.3) Item # 087

Name:	Gary Klein
Organization:	Gary Klein and Associates, Inc.
Recommendation:	Request to accept the code change proposal as modified by this public comment.

Section Number:	501.3
Proposed Text:	**501.3 Permit.** It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any alternative water source system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction. ~~**Exception:** For single family dwellings A a construction permit shall not be required for a clothes washer only system meeting the requirements of Section 501.3.1.~~
Problem Statement:	In general, permits should be required for all applications using alternate sources of water. If the intent was to exempt gray water clothes washer systems from permit, then it may be that the language in Item 087 is sufficient provided reference to the new Section 501.3.1 is stricken, and the term gray water should be added to clothes washer system.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 4:

WE-Stand 2017 – (501.3) Item #087

Name:	Thomas Pape
Organization:	AWE / BMP
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	501.3
Proposed Text:	**501.3 Permit**. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any alternative water source system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction. **Exception**: For single family dwellings a construction permit shall not be required for a clothes washer only system <u>without any water storage and</u> meeting the requirements of Section 501.3.1
Problem Statement:	There is significant health threat wherever nonpotable water is stored. Stagnant water can become a hazard within a few days. This water can breed pathogens and support insects that transmit pathogens such as zika virus and mosquitoes. This can become a hazard to surrounding homes.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 5:

WE-Stand 2017 – (501.3) Item # 087

Name:	H.W. (Bill) Hoffman
Organization:	H.W. (Bill) Hoffman & Assoc.

Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	501.3
Proposed Text:	**501.3 Permit.** It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any alternative water source system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction. **Exception:** For single family dwellings a construction permit shall not be required for a gray water clothes washer ~~only~~ system ~~meeting the requirements of Section 501.3.1~~, but a written notification shall be provided to the AHJ in accordance with Section 501.3.1.
Problem Statement:	Change makes it clear this applies ONLY to single family residential systems.
Referenced Standards:	WE-STAND

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 6:

WE-Stand 2017 – (501.3) Item # 087

Name:	Michael Cudahy
Organization:	Plastic Pipe and Fittings Association
Recommendation:	Request to accept the code change proposal as amended by TC by this public comment
Section Number:	501.3
Proposed Text:	
Problem Statement:	Support the proposal as amended by the TC. The exception should be limited to the single family residential system.
Referenced Standards:	

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Add text
Section Number:	501.3.1
Proposed Text:	**501.3.1 Clothes Washer System.** A clothes washer system in compliance with all of the following is exempt from the construction permit specified in Section 501.3 and may be installed or altered without a construction permit: (1) Where required, notification has been provided to the enforcing agency regarding the proposed location and installation of a gray water irrigation or disposal system. (2) The design shall allow the user to direct the flow to the irrigation or disposal field or the building sewer. The direction control of the gray water shall be clearly labeled and readily accessible to the user. (3) The installation, change, alteration, or repair of the system does not include a potable water connection or a pump and does not affect other building, plumbing, electrical, or mechanical components including structural features, egress, fire-life safety, sanitation, potable water supply piping, or accessibility. The pump in a clothes washer shall not be considered part of the gray water system. (4) The gray water shall be contained on the site where it is generated. (5) Gray water shall be directed to and contained within an irrigation or disposal field. (6) Ponding or runoff is prohibited and shall be considered a nuisance. (7) Gray water shall be permitted to be released above the ground surface provided at least 2 inches (51 mm) of mulch, rock, or soil, or a solid shield covers the release point. Other methods which provide equivalent separation are also acceptable. (8) Gray water systems shall be designed to minimize contact with humans and domestic pets. (9) Water used to wash diapers or similarly soiled or infectious garments shall not be used and shall be diverted to the building sewer. (10) Gray water shall not contain hazardous chemicals derived from activities such as cleaning car parts, washing greasy or oily rags, or disposing of waste solutions from home photo labs or similar hobbyist or home occupational activities. (11) Exemption from construction permit requirements of this code shall not be deemed to grant authorization for any gray water system to be installed in a manner that violates other provisions of this code or any other laws or ordinances of the Authority Having Jurisdiction. (12) An operation and maintenance manual shall be provided to the owner. Directions shall indicate that the manual is to remain with the building throughout the life of the system and upon change of ownership or occupancy. (13) Gray water discharge from a clothes washer system through a standpipe shall be properly trapped in accordance with the plumbing code.
Problem Statement:	Clothes washer only systems that do not alter the existing plumbing (and follow basic health and safety guidelines) are extremely low risk and should be allowed to be installed with no permit. California has had great success with this code and there are many incentive programs across the state for the clothes washer graywater system due to its permit-exempt status. Chapter 16 from the CPC is provided for reference.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 24, NEGATIVE: 2, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
MAJEROWICZ: Systems need to be inspected.
MANN: Nothing should be installed without permits. The requirements listed are unenforceable. No scientific documentation. There was no substantiation submitted to show that California has had great success and what the incentives are.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (501.3.1) Item #088

Name:	Cambria McLeod
Organization:	Kohler Co
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	501.3.1
Proposed Text:	
Problem Statement:	Item # 088 proposes to add new text for installation of a clothes washer gray water system. The provisions enumerated by this proposal reveal the need for permit and inspection, especially when all the provisions from Section 502.0 in WEStand are applicable to a gray water clothes washer system. Without a permit, this installation can pose a risk for health and safety.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (501.3.1) Item #088

Name:	Matt Sigler
Organization:	PMI
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	501.3.1
Proposed Text:	
Problem Statement:	PMI requests that Item #088 be rejected. No technical documentation was provided to demonstrate that a clothes washer system can safely be installed and operated without the need for a permit and inspection. Without a permit and inspection, such an installation could

	pose a risk to public health and safety. Furthermore, if clothes washers are exempt, why not other appliances or plumbing fixtures and fittings installed in single family homes?
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 3:

WE-Stand 2017 – (501.3.1) Item # 088

Name:	H.W. (Bill) Hoffman
Organization:	H.W. (Bill) Hoffman & Assoc.
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	501.3 .1
Proposed Text:	**501.3.1 Clothes Washer System.** A clothes washer system at a single family dwelling in compliance with all of the following is exempt from the construction permit specified in Section 501.3 and may be installed or altered without a construction permit: (Sections (1) through (13) remain the same)
Problem Statement:	Change makes it clear this applies ONLY to single family residential systems. Although the additional text may not be directly enforceable according to some, I believe it should be kept since if they violate any of the standard by not following the laundry list of what must be done, it gives enforcement a way to make them reply if they cause a problem with the gray water system.
Referenced Standards:	WE-STAND

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 4:

WE-Stand 2017 – (501.3.1) Item # 088

Name:	Gary Klein
Organization:	Gary Klein and Associates, Inc.
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	501.3.1
Proposed Text:	**501.3.1 Clothes Washer System.** A clothes washer system shall comply with the provisions of this section: ~~in compliance with all of the following is exempt from the construction permit specified in Section 501.3 and may be installed or altered without a construction permit:~~

	(1) Where required, notification has been provided to the enforcing agency regarding the proposed location and installation of a gray water irrigation or disposal system. (2) The design shall allow the user to direct the flow to the irrigation or disposal field or the building sewer. The direction control of the gray water shall be clearly labeled and readily accessible to the user. (3) The installation, change, alteration, or repair of the system does not include a potable water connection or a pump and does not affect other building, plumbing, electrical, or mechanical components including structural features, egress, fire-life safety, sanitation, potable water supply piping, or accessibility. The pump in a clothes washer shall not be considered part of the gray water system. (4) The gray water shall be contained on the site where it is generated. (5) Gray water shall be directed to and contained within an irrigation or disposal field. (6) Ponding or runoff is prohibited and shall be considered a nuisance. (7) Gray water shall be permitted to be released above the ground surface provided at least 2 inches (51 mm) of mulch, rock, or soil, or a solid shield covers the release point. Other methods which provide equivalent separation are also acceptable. (8) Gray water systems shall be designed to minimize contact with humans and domestic pets. (9) Water used to wash diapers or similarly soiled or infectious garments shall not be used and shall be diverted to the building sewer. (10) Gray water shall not contain hazardous chemicals derived from activities such as cleaning car parts, washing greasy or oily rags, or disposing of waste solutions from home photo labs or similar hobbyist or home occupational activities. (11) Exemption from construction permit requirements of this code shall not be deemed to grant authorization for any gray water system to be installed in a manner that violates other provisions of this code or any other laws or ordinances of the Authority Having Jurisdiction. (12) An operation and maintenance manual shall be provided to the owner. Directions shall indicate that the manual is to remain with the building throughout the life of the system and upon change of ownership or occupancy. (13) Gray water discharge from a clothes washer system through a standpipe shall be properly trapped in accordance with the plumbing code.
Problem Statement:	In general, permits should be required for all applications using alternate sources of water. The long list of items in the original proposal indicate the need for having a permit, so that health and safety can be properly addressed.
Referenced Standards:	

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	501.5
Proposed Text:	**501.5 Maintenance and Inspection.** Alternate water source systems and components shall be inspected and maintained in accordance with ~~Section 501.5.1 through Section 501.5.3.~~ the manufacturer's recommendations, as required by the Enforcing Agency or both.
Problem Statement:	Rational: There are many different system components that will potentially be used in a system and so any generic maintenance chart will be potentially erroneous and could add unnecessary required maintenance. Requiring systems to be maintained and inspected in accordance with the manufacturer is a simple and more effective way to achieve the same goal of having well maintained systems.
Referenced Standards:	

TC ACTION:
Accept as amended:

501.5 Maintenance and Inspection. Alternate water source systems and components shall be inspected and maintained in accordance with Section 501.5.1 through Section 501.5.3, the manufacturer's recommendations, or as required by the ~~Enforcing Agency~~ Authority Having Jurisdiction ~~or both~~.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 26, NOT RETURNED: 2 Gray, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (501.5) Item # 089

Name:	Michael Cudahy
Organization:	Plastic Pipe and Fittings Association
Recommendation:	Request to accept the code change proposal as amended by TC by this public comment.
Section Number:	501.5
Proposed Text:	
Problem Statement:	Change will help increase the adoption of alternate water systems.
Referenced Standards:	

WE-Stand 2017 – (501.5.2) Item # 092

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Delete text
Section Number:	501.5.2
Proposed Text:	~~**501.5.2 Maintenance Log**. A maintenance log for gray water and on-site treated non-potable water systems is required to have a permit in accordance with Section 501.3 and shall be maintained by the property owner and be available for inspection. The property owner or designated appointee shall ensure that a record of testing, inspection and maintenance as required by Table 501.5 is maintained in the log. The log will indicate the frequency of inspection and maintenance for each system.~~ (renumber remaining sections)
Problem Statement:	Rational: This is an onerous requirement and there is no similar requirements for other comparable systems (drinking water wells, septic systems, hot tubs, swimming pools, etc.)
Referenced Standards:	

TC ACTION:
Reject

TC SUBSTANTIATION:
The committee feels that requiring a maintenance log for a permit when installing graywater and on site treated nonpotable water systems is necessary to protect health and safety.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 25, NOT RETURNED: 3 Gray, Sovocool, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (501.5.2) Item # 092

Name:	Michael Cudahy
Organization:	Plastic Pipe and Fittings Association
Recommendation:	Request to accept the code change proposal as submitted by this public comment
Section Number:	501.5.2
Proposed Text:	

Problem Statement:	Agree with proponent. This is an onerous requirement. There is no evidence a maintenance log is needed and this would only encourage unpermitted systems. There are no similar requirements for other home systems, which could have many more potential health risks, for example drinking water wells, septic systems, swimming pools, or hot tubs.
Referenced Standards:	

WE-Stand 2017 – (501.10) Item # 097

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	501.10
Proposed Text:	**501.10 Commercial, Industrial, and Institutional Restroom Signs.** A sign shall be installed in all restrooms in commercial, industrial, and institutional occupancies using reclaimed (recycled) water and on-site treated water for water closets, urinals, or both. ~~Each sign shall contain 1/2 inch (12.7 mm) letters of a highly visible color on a contrasting background.~~ The location of the sign(s) shall be such that the sign(s) shall be visible to all users. The location of the sign(s) shall be approved by the Authority Having Jurisdiction and shall contain the following text: TO CONSERVE WATER, THIS BUILDING USES *____________* TO FLUSH TOILETS AND URINALS.
Problem Statement:	Rational: The size of the letters may differ depending on how close or far away the sign is. Having such a specific requirement seems unnecessarily rigid here.
Referenced Standards:	

TC ACTION:
Reject

TC SUBSTANTIATION:
Committee believes the requirements are appropriate.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 20, NEGATIVE: 5, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
ALLEN: I agree with Kent Sovocool's comment and my original comments.
HOFFMAN: 1/2 inches or GREATER would establish a minimum letter size.
SHAPIRO: Less oversight from govt.
SOVOCOOL: Specifying the size of the letters and the background color to the sign does seem onerous as noted by the commenter.
YEGGY: I agree with Kent Sovocool.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (501.10) Item # 097

Name:	Thomas Pape
Organization:	AWE / BMP

Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	501.10
Proposed Text:	**501.10 Commercial, Industrial, and Institutional Restroom Signs**. A sign shall be installed in all restrooms in commercial, industrial, and institutional occupancies using reclaimed (recycled) water and on-site treated water for water closets, urinals, or both. Each sign shall contain ~~1/2 inch (12.7 mm)~~ letters of a highly visible color on a contrasting background, and letters shall be at least 1/2 inch in height. The location of the sign(s) shall be such that the sign(s) shall be visible to all users. The location of the sign(s) shall be approved by the Authority Having Jurisdiction and shall contain the following text: TO CONSERVE WATER, THIS BUILDING USES *____________* TO FLUSH TOILETS AND URINALS.
Problem Statement:	The Standard should be about minimum requirements, not exact requirements.
Referenced Standards:	

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	501.11
Proposed Text:	**501.11 Inspection and Testing**. Alternate water source systems shall be inspected and tested in accordance with Section 501.11.1 and Section 501.11.2. **Exception**: Non-pressurized graywater or on-site non potable water systems without any connection to a pressurized water system.
Problem Statement:	Rational: Non-pressurized systems without any connection to a pressurized water systems would not require inspection for cross-connection nor inspection for testing potable water piping.
Referenced Standards:	

TC ACTION:
Accept as amended:

501.11 Inspection and Testing. Alternate water source systems shall be inspected and tested in accordance with Section 501.11.1 and Section 501.11.2.
Exception: Non-pressurized graywater or on-site non potable water systems without any connection to a ~~pressurized~~ potable water system.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 26, NOT RETURNED: 2 Gray, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (501.11) Item # 098

Name:	Michael Cudahy
Organization:	Plastic Pipe and Fittings Association
Recommendation:	Request to accept the code change proposal as amended by TC by this public comment
Section Number:	501.11
Proposed Text:	
Problem Statement:	Change will help increase the adoption of alternate water systems.
Referenced Standards:	

Name:	Edward Saltzberg
Organization:	Edward Saltzberg & Associates
Recommendation:	Add text
Section Number:	502.1.2-502.1.2.3
Proposed Text:	**502.1.2 Required.** Every newly constructed single family dwelling shall have the waste piping from all fixtures allowed on a gray water system per the Code. The separate piping system shall be piped to outside the building and terminate with an approved drainage gray water diverter per Section 502.2.3 before connecting to the drainage system from non-gray water fixtures. **Exception** – Existing single-family dwellings and any residence built on soil that will not support percolation. **502.1.2.1 Diverter.** The diverter shall be connected and installed in the open position to the building sewer. The gray water diversion port shall remain capped off until a gray water irrigation/reuse system is installed. **502.1.2.2 Access.** The diverter and sewer connection shall be readily accessible for connection, inspection, maintenance, and servicing. **502.1.2.3 Regulatory.** Gray water reuse and irrigation system components shall meet local, and state code and regulatory requirements.
Problem Statement:	Justification: The document has made great strides in saving energy in new buildings. Codes have made provisions for future solar panels and instantaneous water heaters all to save energy. However, while the Codes address water flows from fixtures, it does not address the water savings that can accrue from capturing the waste water from fixtures allowed on the gray water system. The installation of a total gray water system in a single family dwelling would save each dwelling considerable water, far more water than the low flow shower heads and conversion to ultra-low flow toilets save. The State of California and many other locations are facing a long term drought and we need to conserve water. Total gray water systems cannot be installed unless the waste piping from all the fixtures allowed on a gray water system are piped together to outside the building initially as part of the original dwelling construction. It would be cost prohibitive to try to implement a total gray water system for all the allowed fixtures after the building is built, especially if the house is a slab on ground construction. There is a direct relationship between water use and energy use. Much of the use of energy in the State is for moving water. If each new single family dwelling had an approved gray water system installed, considerable water to each dwelling would be saved so that their water bills would be reduced and their sewer surcharge bills would also be reduced. Furthermore, the water utilities would be delivering less water and sewage treatment plants would be treating less sewage thereby saving considerable energy. Furthermore, this might even negate the requirement for agencies to enlarge their water systems and increase their sewage treatment plants.
Referenced Standards:	

TC ACTION:
Reject

TC SUBSTANTIATION:
The proposed wording does not reflect what needs to happen in construction. Proposal may add confusion with signage regarding which is gray water and which is black water. Proposal considered incomplete as provided.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 24, NEGATIVE: 1, ABSTENTION: 1, NOT RETURNED: 2 Gray, Tabakh

COMMENT ON AFFIRMATIVE:
ALLEN: This is an important proposal and I look forward to seeing the revised language.
PAPE: The revised proposal should be submitted during public comment period.

EXPLANATION OF NEGATIVE:
SALTZBERG: I submitted a revised worded code change that incorporated all of the comments I heard from the committee.

COMMENT ON ABSTENTION:
HOFFMAN: I like the concept in a green code of requiring new residential construction to be gray water ready, but we need to work on this more.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (502.1.2) Item #100

Name:	Edward Saltzberg
Organization:	Edward Saltzberg & Associates
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	502.1.2
Proposed Text:	**502.1.2 ~~Required~~ Grey Water Collection Piping.** In areas with water scarcity, ~~E~~every newly constructed single family dwelling shall have the waste piping from all fixtures, allowed on a gray water system per ~~the~~ ~~C~~code, piped separately to an accessible location where the grey water and black water systems are connected together. This accessible interconnection location can be either inside the building or outside the foundation. The interconnection of the two piping systems shall have an approved diverter valve installed. Grey water reuse systems shall meet local and state codes and regulatory requirements. ~~The separate piping system shall be piped to outside the building and terminate with an approved drainage gray water diverter per Section 502.2.3 before connecting to the drainage system from non-gray water fixtures.~~ **Exception** – Existing single-family dwellings and any residence built on soil that will not support percolation. **502.1.2.1 Diverter.** The diverter shall be connected and installed in the open position to the building sewer. The gray water diversion port shall remain capped off until a gray water irrigation/reuse system is installed. **502.1.2.2 Access.** The diverter and sewer connection shall be readily accessible for connection, inspection, maintenance, and servicing. **502.1.2.3 Regulatory.** Gray water reuse and irrigation system components shall meet local, and state code and regulatory requirements.
Problem Statement:	To respond to the concerns of the Committee as to this Code change's applicability to all areas and to address houses with basements.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (502.1.2 - 501.2.3) Item # 100

Name:	Michael Cudahy
Organization:	Plastic Pipe and Fittings Association
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	502.1.2-502.1.2.3
Proposed Text:	**502.1.2 Required.** ~~Every newly constructed~~ New single family dwellings shall have ~~the~~ a separate waste piping system from all fixtures ~~allowed~~ permitted on a gray water system per the Plumbing Code. The separate piping system shall be piped to outside the building and terminate ~~with~~ into an approved drainage gray water diverter per Section 502.2.3 before connecting to the drainage system from non-gray water fixtures. **Exception -** ~~Existing single-family dwellings and any residence built on~~ Where proven that ground conditions ~~soil that~~ will not support percolation. **502.1.2.1 Diverter.** The diverter shall be connected and installed in the open position to the building sewer. The gray water diversion port shall remain capped ~~off~~ for future use until a gray water irrigation/reuse system is installed. **502.1.2.2 Access.** The diverter and sewer connection shall be ~~readily~~ accessible for connection, inspection, maintenance, and servicing. **502.1.2.3 Regulatory.** Gray water reuse and irrigation system components shall meet local, and state code and regulatory requirements.
Problem Statement:	Pre-plumbing piping systems into buildings is beginning to show in green building programs. Retrofitting grey water into existing, occupied structures is unlikely to occur due to costs and difficulty in re-piping. Our modifications keep the same concept but improve the language of the change.
Referenced Standards:	

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	502.2.1
Proposed Text:	**502.2.1 Discharge.** Gray water diverted away from a sewer or private sewage disposal system, shall discharge to a subsurface irrigation or subsoil irrigation system, or ~~shall discharge~~ to a mulch basin ~~for single family and multi-family dwellings~~. Gray water shall not be used to irrigate root crops or food crops intended for human consumption that come in contact with soil.
Problem Statement:	Rational: Mulch basis are very effective at preventing pooling and runoff of graywater and should be allowed to be used in any suitable location regardless of whether it's single family or multi-family. There are commercial-scale much basins systems functioning well in California and to disallow it for no good reason doesn't make sense.
Referenced Standards:	

TC ACTION:
Accept as amended:

502.2.1 Discharge. Gray water diverted away from a sewer or private sewage disposal system, shall discharge to a subsurface irrigation or subsoil irrigation system, ~~or to a~~ mulch basin, or disposal field. Gray water shall not be used to irrigate root crops or food crops intended for human consumption that come in contact with soil.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 20, NEGATIVE: 5, ABSTENTION: 1, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
KOELLER: Concur with the comments offered by Thomas Pape.
MANN: The current language should remain. Any commercial facility may have mulch basins. This would go through plan check and be approved on a case by case basis by the AHJ.
MECHAM: I concur with Tom Pape and there is no way to enforce what crops are planted in the future, so the possibility of toxins affecting food production will likely increase overtime.
PAPE: My argument is about toxic food. The restriction to residential should remain in the requirements. The disposal from homes of high concentrations of toxins into the gray water system is relatively low and unlikely to systemically enter the food supply. Commercial setting are likely to include many dangerous toxins on-site and the risk of someone disposing them into a fixture attached to a gray water system is much higher. The use of non-residential gray water for irrigation of food should be strictly prohibited.
RAWALPINDIWALA: Agree with other comments.

COMMENT ON ABSTENTION:
DIGIOVANNI: Abstain

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (502.2.1) Item #101

Name:	Thomas Pape
Organization:	AWE / BMP
Recommendation:	Request to accept the code change proposal as modified by this public comment
Section Number:	502.2.1
Proposed Text:	**502.2.1 Discharge**. Gray water diverted away from a sewer or private sewage disposal system of single family and multi-family dwellings, shall discharge to a subsurface irrigation or subsoil irrigation system, or to a mulch basin, or disposal field. Gray water shall not be used to irrigate root crops or food crops intended for human consumption that come in contact with soil.
Problem Statement:	Due to unknown contaminants that are put down drains in commercial facilities, I suggest this be limited to dwelling units that are less likely to have large amounts of hazardous materials.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (502.2.1) Item # 101

Name:	Michael Cudahy
Organization:	Plastic Pipe and Fittings Association
Recommendation:	Request to accept the code change proposal as amended by TC by this public comment
Section Number:	502.2.1
Proposed Text:	
Problem Statement:	Change will increase use of these systems by non-residential buildings.
Referenced Standards:	

WE-Stand 2017 – (502.3) Item # 104

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	502.3
Proposed Text:	**502.3 Connections to Potable and Reclaimed (Recycled) Water Systems.** Gray water systems shall have no unprotected direct connection to any potable water supply, on-site treated non-potable water supply, or reclaimed (recycled) water systems. Potable, on-site treated non-potable, rainwater or reclaimed (recycled) water is permitted to be used as makeup water for a non-pressurized storage tank provided the connection is protected by an airgap, reduced-pressure principle backflow preventer, or other device which prevents backflow in accordance with the plumbing code.
Problem Statement:	Rational: This section should be consistent with the rest of the sections of this code. These edits create that consistency and allow for different protected options in accordance with the plumbing code.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 25, NEGATIVE: 1, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
MANN: This section is specifically for gray water and protected or not there should be no direct connection. The section, as written, does protect public health and safety.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (502.3) Item #104

Name:	Cambria McLeod
Organization:	Kohler Co
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	502.3
Proposed Text:	

Problem Statement:	This proposed revision is a misunderstanding of what is being protected. The make-up water (potable or reclaimed) shall be protected by an air gap or RPZ. But a gray water supply should never connect to any potable water supply. Hence, the language for no direct connection. This revision allows a direct connection of a gray water supply to a potable water system. For public health and safety, the text should remain as is.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (502.3) Item #104

Name:	Matt Sigler
Organization:	PMI
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	502.3
Proposed Text:	
Problem Statement:	PMI requests that Item #104 be rejected. Whether backflow protection is provided or not, there should never be a direct connection between a potable water system and an alternate water system that may contain wastes in accordance with the Uniform Plumbing Code (see Section 603.4.4).
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 3:

WE-Stand 2017 – (502.3) Item # 104

Name:	Thomas Pape
Organization:	AWE / BMP
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	502.3
Proposed Text:	
Problem Statement:	Graywater systems do not have the sanitation and safety of record of reclaimed water and rainwater. The risk of failure of devices to prevent backflow is greater than requiring no direct connection whatsoever. We should not risk human health just to make graywater use easier.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 4:

WE-Stand 2017 – (502.3) Item #104

Name:	Gary Klein
Organization:	Gary Klein and Associates, Inc.
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	502.3
Proposed Text:	
Problem Statement:	There should be no direct connections from gray water systems to the potable water supply.
Referenced Standards:	

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	502.9.7
Proposed Text:	**502.9.7 Backwater Valve.** A backwater valve shall be installed on all gray water drain connections to the sanitary drain or sewer <u>that are subject to backflow</u>.
Problem Statement:	Rational: Not all drains are subject to backflow and won't require a backwater valve, for example, a retrofit installation of a shower graywater line that comes from a second story shower and runs on the exterior of the house. The diversion can happen outside higher than any potential backflow point and would not require a backwater valve.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 14, NEGATIVE: 10; ABSTENTION: 1, NOT RETURNED: 3 Gray, Steffensen, Tabakh

NOTE: Item #109 failed to achieve the necessary 2/3 affirmative vote of returned ballots. In accordance with Section 6.8.2 of the Regulations Governing Consensus Development of WE•Stand, a public comment is requested for this proposal. The technical committee will reconsider this proposal as a public comment.

EXPLANATION OF NEGATIVE:
HOFFMAN: Backflow valves should always be required. Who knows what future home owners will connect to.
KRAUSE: Backwater valves are important to system design and construction to prevent backflow of.
MANN: Who will determine whether or not they will be subject to backflow? The cost of a backwater valve is nothing compared to the cost of clean-up.
MECHAM: Using a backwater valve is good practice.
PAPE: The backwater valve is needed to prevent the gray water from being contaminated without the user realizing the backflow occurred.
RAWALPINDIWALA: Backflow valves should always be required.
SALTZBERG: I think that anytime that the grey water system is connected to a sewer line there should be a back water valve installed.
SIGLER: How does one determine if a gray water connection is subject to backflow?
SOVOCOOL: Permissive language.
YEGGY: Not clear how it will determine if the line is not subject to backflow.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (502.9.7) Item # 109

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Request to accept the code change proposal as submitted by this public comment.
Section Number:	502.9.7
Proposed Text:	**502.9.7 Backwater Valve.** A backwater valve shall be installed on all gray water drain connections to the sanitary drain or sewer that are subject to backflow.
Problem Statement:	Rational: Not all drains are subject to backflow and won't require a backwater valve, for example, a retrofit installation of a shower graywater line that comes from a second story shower and runs on the exterior of the house. The diversion can happen outside higher than any potential backflow point and would not require a backwater valve.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (502.9.7) Item #109

Name:	Thomas Pape
Organization:	AWE / BMP
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	502.9.7
Proposed Text:	
Problem Statement:	It is argumentative to determine "subject to backflow". For the public safety we should require all such connections to have a backwater valve.
Referenced Standards:	

WE-Stand 2017 – (502.11.2.1) Item # 117

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Delete text
Section Number:	502.11.2.1
Proposed Text:	~~**502.11.2.1 Single Family and Multi-Family Dwellings**. The gray water discharge to a mulch basin is limited to single family and multi-family dwellings.~~ (Renumber remaining sections)
Problem Statement:	Rational: Using a mulch basin is a method of filtering and distributing graywater subsurface. It is an affordable and simple method to increase absorption in the soil, decrease soil compaction, and provide surge capacity. If a designer/installers wants to use this method it should not matter what type of building the water is coming from. The amount of flow and types of plants that will be irrigated will determine if this method is preferable over others. Evergreen Lodge near Yosemite, CA is a great example of mulch basin irrigation being used in a commercial application. They have 40 cabins, a commercial laundry, and staff showers and laundry all on greywater with mulch basins.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 24, NEGATIVE: 2, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
MANN: This requirement must remain for single and multi-family residences. Anything else will go before plan check and the AHJ. They will or will not be accepted on a case by case basis. The proponent offers no credible substantiation other than one's personal feelings.
RAWALPINDIWALA: Agree with Dave Mann.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (502.11.2.1) Item #117

Name:	Thomas Pape
Organization:	AWE / BMP
Recommendation:	Request to reject the code change proposal by this public comment.

Section Number:	502.11.2.1
Proposed Text:	
Problem Statement:	We have good confidence in the likely materials put down residential basins. Commercial properties use a wide variety of hazardous materials that could end up in a mulch basin. Public health concerns should limit this practice to residential for now.
Referenced Standards:	

WE-Stand 2017 – (601.2) Item # 127

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	601.2
Proposed Text:	**601.2 System Design.** Rainwater catchment systems shall be designed in accordance with this chapter by a person registered<u>,</u> ~~or~~ licensed<u>, or deemed competent</u> ~~to perform plumbing design work or who demonstrates competency~~ to design rainwater catchment systems as required by the Authority Having Jurisdiction. Components, piping, and fittings used in any rainwater catchment systems shall be listed. **Exceptions:** (1) A person registered or licensed to perform plumbing design work is not required to design rainwater catchment systems used for irrigation with a maximum storage capacity of <u>5 000</u> ~~360~~ gallons (~~1363~~ <u>18 927</u> L) <u>where the tank is supported directly upon grade and the ratio of height to width (or diameter) does not exceed 2 to 1</u>. (2) A person registered or licensed to perform plumbing design work is not required to design rainwater catchment systems for single family dwellings where all outlets, piping, and system components are located on the exterior of the building.
Problem Statement:	Rational: The specific skills needed to install most non-potable rainwater catchment systems for irrigation are predominately landscape irrigation (the irrigation system) or roofing (if gutters are altered) type of work, not plumbing work. Landscape contractors install a lot more rainwater catchment systems than do plumbing contractors. This requirement in 601.2 should be general to allow for the local experts from whatever field to be able to install the systems. The language I'm suggesting is consistent with the potable rainwater catchment system appendix from this code. Rational: 360 gallons is very small, this water would be used up in a less than week to irrigate a 1,000 square foot lawn during the summer. There is no real difference in the complexity or design of a 360 gallon system versus a 5,000 gallons system, so long as the tank is stable on a stable foundation. By using the 5,000 gallons number this code would be consistent with most existing codes for water storage- no permit is needed so long as the tank is under 5,000 gallons. This would also be consistent with California's rainwater code. Chapter 17 of the CA Plumbing Code provided for reference.
Referenced Standards:	

TC ACTION:
Accept as amended:

601.2 System Design. Rainwater catchment systems shall be designed in accordance with this chapter by a ~~person registered,~~ ~~licensed, or deemed competent~~ <u>registered design professional or a person who demonstrates competency</u> to design rainwater catchment systems as required by the Authority Having Jurisdiction. Components, piping, and fittings used in any rainwater catchment systems shall be listed.

Exceptions:
(1) A ~~person registered or licensed to perform plumbing design work is not required to design~~ rainwater catchment system~~s~~ used for irrigation with a maximum storage capacity of 5 000 gallons (18 927 L) where the tank is supported directly upon grade and the ratio of height to width (or diameter) does not exceed 2 to 1.

(2) A ~~person registered or licensed to perform plumbing design work is not required to design~~ rainwater catchment system~~s~~ for single family dwellings where all outlets, piping, and system components are located on the exterior of the building.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 18, NEGATIVE: 6, ABSTENTION: 2, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
MAJEROWICZ: Existing language is adequate.
MANN: A plumbing contractor is more than qualified to design these system. That contractor should not be excluded for landscape contractor that knows nothing about a plumbing system.
PAPE: A licensed plumbing designer should not be the only qualified, but the licencee should not have to prove competency to the AHJ.
RAWALPINDIWALA: Prefer original language.
SALTZBERG: The phrase "deemed competent" is a very subjective way of determining competency.
TINDALL: The word deemed competent is subjective, the applicant may understand the graywater system but not the entire pluming system.

COMMENT ON ABSTENTION:
HOFFMAN: The phrase "deemed competent" is a very subjective way of determining competency. We need to revisit this one.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (601.2) Item # 127

Name:	Thomas Pape
Organization:	AWE / BMP
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	601.2
Proposed Text:	**601.2 System Design.** Rainwater catchment systems shall be designed in accordance with this chapter by a registered design professional or a person who demonstrates competency to design rainwater catchment systems as required by the Authority Having Jurisdiction. Components, piping, and fittings used in any rainwater catchment systems shall be listed. **Exceptions**: (1) rainwater catchment systems used for irrigation with a maximum storage capacity of ~~5 000~~ 500 gallons (~~18 927~~ 1 892.7 L) where the tank is supported directly upon grade and the ratio of height to width (or diameter) does not exceed 2 to 1. (2) rainwater catchment systems for single family dwellings where all outlets, piping, and system components are located on the exterior of the building.
Problem Statement:	The volume of 500 gallons is a more reasonable project that will not likely pose a threat to human health. A capacity of 5000 gallons could jeopardize safety of surrounding homes and inhabitants.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (601.2) Item #127

Name:	Gary Klein
Organization:	Gary Klein and Associates, Inc.
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	601.2
Proposed Text:	
Problem Statement:	The original wording in the paragraph covered the cases the revision attempted to cover, so I am recommending that we go back to the starting point. I am not convinced that either 360 gallons or 5,000 gallons is the correct size of the storage tank to determine the need for a licensed plumber. Maybe 2,500 gallons?
Referenced Standards:	

WE-Stand 2017 – (601.3) Item # 128

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	601.3
Proposed Text:	**601.3 Permit.** It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any rainwater catchment system in a building or on a premises without first obtaining a permit to do such work from the Authority Having Jurisdiction. Exceptions: (1) A permit is not required for exterior rainwater catchment systems used for outdoor drip and subsurface irrigation with a maximum storage capacity of 5 000 ~~360~~ gallons (~~1363~~ 18 927 L) where the tank is supported directly upon grade and the ratio of height to width (or diameter) does not exceed 2 to 1 and it does not require electrical power or a make-up water supply connection. (2) A plumbing permit is not required for rainwater catchment systems for single family dwellings where all outlets, piping, and system components are located on the exterior of the building. This does not exempt the need for permits if required for electrical connections, tank supports, or enclosures.
Problem Statement:	Rational: Exempting permits from systems with the tanks smaller than 5,000 gallons would be consistent with most codes for water storage tanks as well as California's rainwater code. If the tank is stable, upon grade, and doesn't require power or make-up water it is a very safe and low-risk system and thus should not require permits. Chapter 17 of the CPC supplied for reference.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 24, NEGATIVE: 2, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
MAJEROWICZ: 5000 gallons is too high without a permit.
MANN: The exception for no permit was intended for small systems, hence the 360 gallons. Increasing the size to 5,000 gallons was not the original intent. This exception should not be increased to 5,000 gallons. This is not protecting the health and safety of the public.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (601.3) Item #128

Name:	Thomas Pape

Organization:	AWE / BMP
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	601.3
Proposed Text:	**601.3 Permit**. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any rainwater catchment system in a building or on a premises without first obtaining a permit to do such work from the Authority Having Jurisdiction. Exceptions: (1) A permit is not required for exterior rainwater catchment systems used for outdoor drip and subsurface irrigation with a maximum storage capacity of ~~5 000~~ 500 gallons (~~18 927~~ 1892.7 L) where the tank is supported directly upon grade and the ratio of height to width (or diameter) does not exceed 2 to 1 and it does not require electrical power or a make-up water supply connection. (2) A plumbing permit is not required for rainwater catchment systems for single family dwellings where all outlets, piping, and system components are located on the exterior of the building. This does not exempt the need for permits if required for electrical connections, tank supports, or enclosures.
Problem Statement:	The 5000 gallon storage allowance is not duly protecting human health. 500 gallons allowance is more reasonable to protect the neighboring homes and the residents.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (601.3) Item #128

Name:	Gary Klein
Organization:	Gary Klein and Associates, Inc.
Recommendation:	Request to reject the code change proposal as submitted by this public comment
Section Number:	601.3
Proposed Text:	
Problem Statement:	I am not certain that either 360 gallons or 5,000 gallons is the right volume to be determining the need for a permit. Perhaps 2,500 gallons?
Referenced Standards:	

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Delete text
Section Number:	601.5.2
Proposed Text:	~~**601.5.2 Maintenance Log.** A maintenance log for rainwater catchment systems is required to have a permit in accordance with Section 601.3 and shall be maintained by the property owner and be available for inspection. The property owner or designated appointee shall ensure that a record of testing, inspection and maintenance as require by Table 601.5 is maintained in the log. The log will indicate the frequency of inspection and maintenance for each system.~~ (renumber remaining sections)
Problem Statement:	Rational: This is an onerous requirement. There is no evidence a maintenance log is needed and this would only encourage unpermitted systems. There are no similar requirements for other home systems, that could have many more potential health risks, for example drinking water wells, septic systems, swimming pools, or hot tubs.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 14, NEGATIVE: 11, ABSTENTION: 1, NOT RETURNED: 2 Gray, Tabakh

NOTE: Item #129 failed to achieve the necessary 2/3 affirmative vote of returned ballots. In accordance with Section 6.8.2 of the Regulations Governing Consensus Development of WE•Stand, a public comment is requested for this proposal. The technical committee will reconsider this proposal as a public comment.

EXPLANATION OF NEGATIVE:
HOFFMAN: Documentation is the only thing we have after instillation. We need to reject to keep original intent.
KOELLER: Concur with the comments of Kent Sovocool, Bill Hoffman, Matt Sigler, and Thomas Pape.
KRAUSE: Maintenance logs are important to demonstrate system is being operated and cared for so they will function properly.
MAJEROWICZ: Same as Tom Pape.
MANN: No technical data submitted to support the problem statement. Section 601.3 states that no permit is required for certain residential applications. So to state that this would encourage unpermitted systems is illogical.
MECHAM: I agree with other comments against acceptance.
PAPE: In the event of a health problem, maintenance logs are important to prove or disprove proper maintenance has occurred. It is also valuable to the new owner when the property is sold. If maintenance is performed, it seems recording the event would be only a very minor inconvenience to the user.
RAWALPINDIWALA: Agree with other comments.

SIGLER: The proponent has failed to provide any technical data to demonstrate that the proposed language will not jeopardize public health and safety.
SOVOCOOL: Documentation of maintenance is the only reasonable way for an AHJ to check it has occurred in situations where an AHJ is required to do so.
TINDALL: Same as all the above.

COMMENT ON ABSTENTION:
DIGIOVANNI: Abstain

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (601.5.2) Item # 129

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Request to accept the code change proposal as submitted by this public comment.
Section Number:	601.5.2
Proposed Text:	~~**601.5.2 Maintenance Log.** A maintenance log for rainwater catchment systems is required to have a permit in accordance with Section 601.3 and shall be maintained by the property owner and be available for inspection. The property owner or designated appointee shall ensure that a record of testing, inspection and maintenance as require by Table 601.5 is maintained in the log. The log will indicate the frequency of inspection and maintenance for each system.~~ (renumber remaining sections)
Problem Statement:	Rational: This is an onerous requirement. There is no evidence a maintenance log is needed and this would only encourage unpermitted systems. There are no similar requirements for other home systems, that could have many more potential health risks, for example drinking water wells, septic systems, swimming pools, or hot tubs.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (601.5.2) Item #129

Name:	Thomas Pape
Organization:	AWE / BMP
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	601.5.2

Proposed Text:	
Problem Statement:	In the event of a health problem, maintenance logs are important to prove or disprove proper maintenance has occurred. It is also valuable to the new owner when the property is sold. If maintenance is performed, it seems recording the event would be only a very minor inconvenience to the user.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 3:

WE-Stand 2017 – (601.5.2) Item # 129

Name:	Michael Cudahy
Organization:	Plastic Pipe and Fittings Association
Recommendation:	Request to accept the code change proposal as submitted by this public comment
Section Number:	601.5.2
Proposed Text:	
Problem Statement:	Agree with proponent. This is an onerous requirement. There is no evidence a maintenance log is needed and this would only encourage unpermitted systems. There are no similar requirements for other home systems, which could have many more potential health risks, for example drinking water wells, septic systems, swimming pools, or hot tubs.
Referenced Standards:	

WE-Stand 2017 – (602.4) Item # 131

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	602.4
Proposed Text:	**602.4 Connections to Potable or Reclaimed (Recycled) Water Systems.** Rainwater catchment systems shall have no <u>unprotected</u> direct connection to any potable water supply or alternate water source system. Potable or reclaimed (recycled) water shall be permitted to be used as makeup water for a rainwater catchment system provided the potable or reclaimed (recycled) water supply connection is protected by an airgap or reduced-pressure principle backflow preventer in accordance with the plumbing code.
Problem Statement:	Rational: In other sections of this code reduced pressure principal devices are allows. It should be clarified throughout the code that unprotected direct connections are not allowed.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 25, NEGATIVE: 1, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
MANN: One does not want to connect rainwater to the potable water system. The potable should be attached to the rainwater system as a make-up. There is a reason for this language. It protects the health and safety of the public.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (602.4) Item #131

Name:	Cambria McLeod
Organization:	Kohler Co
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	602.4
Proposed Text:	

Problem Statement:	This proposed revision is a misunderstanding of what is being protected. The make-up water (potable or reclaimed) shall be protected by an air gap or RPZ. But a rainwater supply should never connect to any potable water supply. Hence, the language for no direct connection. This revision allows a direct connection of a rainwater supply to a potable water system. For public health and safety, the text should remain as is.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (602.4) Item #131

Name:	Matt Sigler
Organization:	PMI
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	602.4
Proposed Text:	
Problem Statement:	PMI requests that Item #131 be rejected. A potable water system should never be installed in such a manner as to lead to possible contamination from sources of used, unclean, polluted or contaminated water in accordance with the Uniform Plumbing Code (see Section 602.1).
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 3:

WE-Stand 2017 – (602.4) Item # 131

Name:	H.W. (Bill) Hoffman
Organization:	H.W. (Bill) Hoffman & Assoc.
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	602.4
Proposed Text:	**602.4 Connections to Potable or Reclaimed (Recycled) Water Systems.** Rainwater catchment systems shall have no unprotected direct connection to any potable water supply or alternate water source system. Potable or reclaimed (recycled) water shall be permitted to be used as makeup water to a cistern or storage tank for a rainwater catchment system provided the potable or reclaimed (recycled) water supply connection is protected by an airgap. ~~or reduced-pressure principle backflow preventer in accordance with the plumbing code.~~ In all cases, the potable water connection to distribution system shall be protected with a reduced pressure principle back flow preventer.

Problem Statement:	The public water supply system should always be protected if any form of alternate water is used on site.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 4:

WE-Stand 2017 – (602.4) Item # 131

Name:	John Koeller
Organization:	Koeller and Company
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	602.4
Proposed Text:	
Problem Statement:	This revision as written allows a direct connection of a gray water supply or rainwater supply to a potable water system, which potentially endangers public health. The potable should be attached to the rainwater system as a make-up ONLY. The make-up water (potable or reclaimed) shall be protected by an air gap or RPZ.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 5:

WE-Stand 2017 – (602.4) Item # 131

Name:	Gary Klein
Organization:	Gary Klein and Associates, Inc.
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	602.4
Proposed Text:	
Problem Statement:	There appears to be some confusion regarding the direction of flow from one system to another. Potable can connect to rainwater systems and the potable water supply should always be protected. Rainwater should not connect directly to the potable supply.
Referenced Standards:	

WE-Stand 2017 – (602.9.4) Item # 135

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	602.9.4
Proposed Text:	**602.9.4 Minimum Water Quality.** The minimum water quality for harvested rainwater shall meet the applicable water quality requirements for the intended applications as determined by the Authority Having Jurisdiction. In the absence of water quality requirements determined by the Authority Having Jurisdiction, the minimum treatment and water quality shall also comply with Table 602.9.4. **Exception:** No treatment is required for rainwater used for non-spray ~~subsurface or non-sprinkled surface~~ irrigation where the maximum storage volume is less than 5 000 ~~360~~ gallons (~~1363~~ 18 727 L).
Problem Statement:	Rational: 360 gallons is very small, this water would be used up in a less than week to irrigate a 1,000 square foot lawn during the summer. Requiring treatment for a system over 360 gallons is onerous and unnecessary. 5,000 gallons would be used in 10 weeks on a 1,000 square foot lawn.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 25, NEGATIVE: 1, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
MANN: There is/was no justification submitted to change from 360 gallons to 5,000 gallons. The rational is simply the proponent's feelings. What if one only needs to water once a week compared to two or three times a week. What if one lives in the Mid-west? What if one lives in any jurisdiction other than California?

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (602.9.4) Item # 135

Name:	Cambria McLeod
Organization:	Kohler Co
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	602.9.4

Proposed Text:	
Problem Statement:	There was no justification submitted to change from 360 gallons to 5,000 gallons. 360-gallon storage capacity exemption was based on 4 rain barrels (90 gallons each) for a single family home. Rain barrels are non-treated and typically used for plant irrigation. They can also be used for very small drip and sub-surface irrigation (e.g. for a garden). A 5,000-gallon storage tank is for large systems and therefore require a permit and applicable treatment.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (602.9.4) Item #135

Name:	Thomas Pape
Organization:	AWE / BMP
Recommendation:	Request to accept the code change proposal as modified by this public comment
Section Number:	602.9.4
Proposed Text:	**602.9.4 Minimum Water Quality.** The minimum water quality for harvested rainwater shall meet the applicable water quality requirements for the intended applications as determined by the Authority Having Jurisdiction. In the absence of water quality requirements determined by the Authority Having Jurisdiction, the minimum treatment and water quality shall also comply with Table 602.9.4. **Exception**: No treatment is required for rainwater used for non-spray irrigation where the maximum storage volume is less than ~~5000~~ <u>500</u> gallons (~~18 727~~ <u>1 872.7</u>L).
Problem Statement:	Public safety should be a greater priority than user convenience. 5000 gallons of untreated water is an unnecessary risk to public health.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 3:

WE-Stand 2017 – (602.9.4) Item # 135

Name:	H.W. (Bill) Hoffman
Organization:	H.W. (Bill) Hoffman & Assoc.
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	602.9.4

Proposed Text:	**602.9.4 Minimum Water Quality.** The minimum water quality for harvested rainwater shall meet the applicable water quality requirements for the intended applications as determined by the Authority Having Jurisdiction. In the absence of water quality requirements determined by the Authority Having Jurisdiction, the minimum treatment and water quality shall also comply with Table 602.9.4. **Exception:** No treatment is required for rainwater used for non-spray irrigation where the maximum storage volume is less than ~~5000~~ 300 gallons (1363 ~~18 727~~ L).
Problem Statement:	300 gallons should be the maximum allowed. Beyond this, a permit should be required.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 4:

WE-Stand 2017 – (602.9.4) Item # 135

Name:	John Koeller
Organization:	Koeller and Company
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	602.9.4
Proposed Text:	**Exception:** No treatment is required for rainwater used for non-spray irrigation where the maximum storage volume is less than ~~5 000~~ ~~360~~ 360 gallons (~~1363~~ ~~18 727~~ 1363L).
Problem Statement:	The 360-gallon storage capacity exemption was based on 4 rain barrels (90 gallons each) for a single family home. Rain barrels are non-treated and typically used for plant irrigation. They can also be used for very small drip and sub-surface irrigation (e.g. for a garden). A 5,000-gallon storage tank is for large systems and therefore requires a permit and applicable treatment.
Referenced Standards:	

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Delete text
Section Number:	602.11.2.4
Proposed Text:	~~**602.11.2.4 Annual Inspection.** An annual inspection of the rainwater catchment system, following the procedures listed in Section 602.11.2.1 shall be required. Annual cross-connection testing, following the procedures listed in Section 602.11.2.2 shall be required by the Authority Having Jurisdiction, unless site conditions do not require it. In no event shall the test occur less than once in 4 years. Alternate testing requirements shall be approved by the Authority Having Jurisdiction.~~
Problem Statement:	Requiring all rainwater systems to be inspected annually is an onerous requirement and inconsistent with other similar systems (drinking water wells, septic systems, swimming pools, hot tubs, etc.). This requirement would deter legal installations. Local jurisdictions will require cross-connection testing if needed based on other regulations, as well as section 602.11.2 of this same standard.
Referenced Standards:	

Staff Note: Similar language found in Section 501.11.2.4.

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 15, NEGATIVE: 9, ABSTENTION: 2, NOT RETURNED: 2 Gray, Tabakh

NOTE: Item #141 failed to achieve the necessary 2/3 affirmative vote of returned ballots. In accordance with Section 6.8.2 of the Regulations Governing Consensus Development of WE•Stand, a public comment is requested for this proposal. The technical committee will reconsider this proposal as a public comment.

EXPLANATION OF NEGATIVE:
KOELLER: Concur with the comments of Thomas Pape, Kent Sovocool, Bill Hoffman, and Matt Sigler.
MAJEROWICZ: To protect public safety and health systems must be inspected annually.
MANN: I have read and agree with the comments of Tom Pape, Matt Sigler and Kent Sovocool. If stricken this would be in conflict with the UPC.
MECHAM: Current language has flexibility included as it might be enforced to meet specific site requirements.
PAPE: While I agree that small system might not require annual testing, there should be some level of oversight for some systems, probably based on size and end-use of the water. I prefer the proponent provide a revised inspection plan, rather than the total elimination of the inspections.
RAWALPINDIWALA: Agree with other comments.
SIGLER: The proponent has failed to provide any technical data to demonstrate that the proposed language will not jeopardize public health and safety.

SOVOCOOL: While annual inspection may indeed be onerous, total elimination of all testing is too sweeping to protect the health of the occupants.
TINDALL: To protect the health and safety they need to be tested annually.

COMMENT ON ABSTENTION:
DIGIOVANNI: Abstain
HOFFMAN: We need to revisit this one to set logical criteria for when to inspect.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (602.11.2.4) Item # 141

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Request to accept the code change proposal as submitted by this public comment.
Section Number:	602.11.2.4
Proposed Text:	~~**602.11.2.4 Annual Inspection.** An annual inspection of the rainwater catchment system, following the procedures listed in Section 602.11.2.1 shall be required. Annual cross-connection testing, following the procedures listed in Section 602.11.2.2 shall be required by the Authority Having Jurisdiction, unless site conditions do not require it. In no event shall the test occur less than once in 4 years. Alternate testing requirements shall be approved by the Authority Having Jurisdiction.~~
Problem Statement:	Requiring all rainwater systems to be inspected annually is an onerous requirement and inconsistent with other similar systems (drinking water wells, septic systems, swimming pools, hot tubs, etc.). This requirement would deter legal installations. Local jurisdictions will require cross-connection testing if needed based on other regulations, as well as section 602.11.2 of this same standard.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (602.11.2.4) Item # 141

Name:	Michael Cudahy
Organization:	Plastic Pipe and Fittings Association
Recommendation:	Request to accept the code change proposal as submitted by this public comment.
Section Number:	602.11.2.4
Proposed Text:	

Problem Statement:	Agree with proponent's statement. Requiring all rainwater systems to be inspected annually is an onerous requirement and inconsistent with other similar systems (drinking water wells, septic systems, swimming pools, hot tubs, etc.). This requirement would deter legal installations. Local jurisdictions will require cross-connection testing if needed based on other regulations, as well as section 602.11.2 of this same standard. Also, the existing language is confusing.
Referenced Standards:	

Name:	Gary Morgan
Organization:	Viega LLC
Recommendation:	Revise text
Section Number:	702.7.1
Proposed Text:	**702.7.1 Maximum Length / Volume of Hot Water in a Branch.** The maximum length of a branch between and source of hot water and the fixture fitting shall not exceed 15 feet or the volume shall not exceed 24 oz. Water heaters, recirculation loops and electrically heat traced pipe shall be considered sources of hot water. Where a fixture fitting shut off valve (supply stop) is installed ahead of the fixture fitting, the maximum length is measured between the source of hot water and the fixture fitting shut off valve (supply stop). **Exceptions**: 1. Where a design layout of a parallel or induced re-circulation loop is used, the maximum length of a branch that is designed to induce flow parallel to a main recirculation system when there is no fixture demanding hot water shall not be subject to the length and internal volume limits. 2. Where a design layout of a series branch is used, branches that incorporate two or more flow-through style fittings as the final connection to a fixture fitting shut off valve shall not exceed 25 foot (7670 m) or the volume shall not exceed 40 ounces (1183 ml). 3. Where a design layout of a series ring is used, branches that incorporate flow-through style fittings as the final connection to a fixture fittings shut off valve and that are piped to provide multiple paths from a recirculation system, but do not experience continuous flow without fixture demand shall not exceed 50 feet (15 240 mm) or the volume shall not exceed 80 ounces (2366 ml). (Renumber existing exceptions 1. and 2. to 4. and 5. respectively)
Problem Statement:	Flow-through style fittings should be considered and even promoted in this code for use in hot and cold water distribution systems to effectively and economically reduce or eliminate dead leg pipe runs to fixtures which can otherwise promote the growth of legionella type bacteria and create water waste while purging tepid water from the dead branch. A fixture shut off valve is attached directly to the flow-through style fitting serving the end-use device. 1. Flow-through fittings can be utilized along with a venturi, valve, or other pressure manipulating device to create secondary recirculation loops that operate in parallel to a primary recirculation loop. These secondary loops, because they have constantly flowing hot water, are also considered a source of hot water. (this principle has been used for years with heating and cooling water) 2. Flow-through fittings can be used to plumb fixtures in series branch (daisy chaining) and use of a fixture draws fresh hot water through other fixture's fittings. Plumbing fixtures in series leads to a more efficient overall system, but may require physically longer branches by a factor of the spacing between the fixtures. 3. Flow-through fittings can be used to plumb fixtures into a series ring (with 2 flow paths to the same hot water source). Water flows along the path of least resistance and any fixture used will bring fresh hot water to each other fixture in the loop. These designs are inherently safer and more efficient and should not be subject to the same limitations as a dead-leg branches. See separate pictorial document illustrating these three different design layouts utilizing flow-through fittings. Illustrations provided as reference.
Referenced Standards:	

TC ACTION:
Reject

TC SUBSTANTIATION:
Further substantiation is needed to support the proposal. Appears to specify a design method that is not appropriate for the standard. Volume and length should be revisited due to pathogen control issues.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 25, NEGATIVE: 1, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
SIGLER: This proposal and Item #10 outline a truly efficient method for delivering hot water. I would encourage the proponent to submit additional technical data, during the public comment stage, to further substantiate these proposals.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (702.7) Item # 143

Name:	Gary Morgan
Organization:	Viega LLC
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	702.7.1
Proposed Text:	**702.7 Maximum ~~Length and~~ Volume and Length of Hot Water.** The maximum ~~length and~~ volume of water contained in a hot water branch shall comply with Section 702.7.1. ~~The water volume shall be calculated using Table 702.7.~~ The maximum length per volume of piping shall comply with Section 702.7.2. **702.7.1 Maximum ~~Length /~~ Volume of Hot Water in a Branch.** The water volume per foot of piping shall be calculated using Table 702.7.1. The maximum ~~length~~ volume of water in ~~of~~ a fixture branch between ~~and~~ any source of hot water (water heaters, recirculation loops and electrically heat traced pipe shall be considered sources of hot water) and the fixture fitting shall be: ~~not exceed 15 feet or the volume shall not exceed 24 oz. Water heaters, recirculation loops and electrically heat traced pipe shall be considered sources of hot water. Where a fixture fitting shut off valve (supply stop) is installed ahead of the fixture fitting, the maximum length is measured between the source of hot water and the fixture fitting shut off valve (supply stop).~~ (1) 24 oz. where a single branch serves a single fixture, (2) 40 oz. where a series branch incorporating one or more flow-through style fittings serves two or more fixtures. (3) 60 oz. where a ring branch incorporating two or more flow-through style fittings serves two or more fixtures. **Exceptions**: 1. The maximum ~~length~~ volume of ~~the~~ a single branch or series branch between any source of hot water and a kitchen sink and dishwasher located on an island or a peninsula where the floor is a concrete slab shall not ~~exceed 25 feet or the volume shall not exceed~~ contain more than 40 oz.

2. The maximum ~~length~~ volume of ~~the~~ a single branch to a stand-alone tub shall not ~~exceed 25 feet~~ contain more than 80 oz.

702.7.2 Maximum Length per Volume of Water in a Branch. For fixture branches in accordance with Section 702.7.1, the maximum length of piping shall be calculated using Table 702.7.2(1) through Table 702.7.2(4). Where a fixture fitting shut off valve (supply stop) is installed ahead of the fixture fitting, the maximum length is measured between the source of hot water and the fixture fitting shut off valve (supply stop).

(renumber the remaining subsection)

TABLE 702.7.1

WATER VOLUME FOR DISTRIBUTION PIPING MATERIALS

OUNCES OF WATER PER FOOT LENGTH OF PIPING														
NOMINAL SIZE (inch)	COPPER M	COPPER L	COPPER K	CPVC CTS SDR 11	CPVC SCH 40	PEX-AL-PEX	PE-AL-PE	CPVC SCH 80	PEX CTS SDR 9	PE-RT CTS SDR 9	PP SDR 6	PP SDR 7.3	PP SDR 11[1]	CPVC PIPE SDR 11
1/4	NA	0.52	0.49	0.31	0.62	NA	NA	0.42	0.30	0.30	NA	NA	NA	0.84
3/8	1.06	0.97	0.84	~~NA~~ 0.68	1.17	~~0.63~~ 0.59	~~0.63~~ 0.59	~~NA~~ 0.85	0.64	0.64	~~0.91~~ 0.85	~~1.09~~ 1.02	NA	1.48
1/2	1.69	1.55	1.45	~~1.25~~ 1.23	1.89	~~1.31~~ 1.22	~~1.31~~ 1.22	~~1.46~~ 1.44	1.18	1.18	~~1.41~~ 1.35	~~1.68~~ 1.64	NA	2.33
3/4	3.43	3.22	2.90	~~2.67~~ 2.52	3.38	~~3.39~~ 3.28	~~3.39~~ 3.28	~~2.74~~ 2.72	2.35	2.35	~~2.23~~ 2.14	~~2.62~~ 2.54	NA	3.68
1	5.81	5.49	5.17	~~4.43~~ 4.24	5.53	~~5.56~~ 5.37	~~5.56~~ 5.37	4.58	~~3.91~~ 3.88	~~3.91~~ 3.88	~~3.64~~ 3.46	~~4.36~~ 4.22	NA	5.83
1 1/4	8.70	8.36	8.09	~~6.61~~ 6.38	9.66	~~8.49~~ 8.65	~~8.49~~ 8.65	8.23	5.80	5.80	~~5.73~~ 5.47	~~6.81~~ 6.59	NA	9.35
1 1/2	12.18	11.83	11.45	~~9.22~~ 8.95	13.20	~~13.88~~ 13.91	~~13.88~~ 13.91	11.38	8.08	8.08	~~9.03~~ 8.64	~~10.61~~ 10.27	NA	12.27
2	21.50	20.58	20.04	~~15.79~~ 15.38	21.88	~~21.48~~ 23.16	~~21.48~~ 23.16	19.11	13.86	13.86	~~14.28~~ 13.64	~~16.98~~ 16.42	NA	19.19

For SI units: 1 foot = 304.8 mm, 1 ounce = 29.573 mL

[1] PP SDR 11 products are not typically used or rated at 180°F.

TABLE 702.7.2(1)

LENGTH (FT) PER VOLUME OF PIPING

	COPPER TYPE M			COPPER TYPE L			COPPER TYPE K		
NOMINAL SIZE (inch)	**24 OZ**	**40 OZ**	**60 OZ**	**24 OZ**	**40 OZ**	**60 OZ**	**24 OZ**	**40 OZ**	**60 OZ**
1/4	NA	NA	NA	46.3	77.2	115.8	49.4	82.3	123.5
3/8	22.7	37.8	56.7	24.9	41.4	62.1	28.4	47.4	71.1
1/2	14.2	23.7	35.5	15.5	25.8	38.7	16.5	27.6	41.4
3/4	7.0	11.6	17.5	7.5	12.4	18.6	8.3	13.8	20.7
1	4.1	6.9	10.3	4.4	7.3	10.9	4.6	7.7	11.6
1 1/4	2.8	4.6	6.9	2.9	4.8	7.2	3.0	4.9	7.4
1 1/2	2.0	3.3	4.9	2.0	3.4	5.1	2.1	3.5	5.2
2	1.1	1.9	2.8	1.2	1.9	2.9	1.2	2.0	3.0

For SI units: 1 foot = 304.8 mm, 1 ounce = 29.573 mL

TABLE 702.7.2(2)

LENGTH (FT) PER VOLUME OF PIPING

	CPVC CTS SDR 11			CPVC SCH 40 PIPE			CPVC SCH 80 PIPE			CPVC SDR 11 PIPE		
NOMINAL SIZE (inch)	**24 OZ**	**40 OZ**	**60 OZ**	**24 OZ**	**40 OZ**	**60 OZ**	**24 OZ**	**40 OZ**	**60 OZ**	**24 OZ**	**40 OZ**	**60 OZ**

1/4	76.6	127.6	191.4	38.8	64.7	97.1	57.8	96.3	144.5	28.7	47.9	71.8
3/8	35.5	59.1	88.6	20.5	34.2	51.4	28.3	47.2	70.7	16.2	27.0	40.4
1/2	19.5	32.6	48.8	12.7	21.1	31.7	16.6	27.7	41.5	10.3	17.2	25.7
3/4	9.5	15.9	23.8	7.1	11.8	17.8	8.8	14.7	22.0	6.5	10.9	16.3
1	5.7	9.4	14.2	4.3	7.2	10.9	5.2	8.7	13.1	4.1	6.9	10.3
1 1/4	3.8	6.3	9.4	2.5	4.1	6.2	2.9	4.9	7.3	2.6	4.3	6.4
1 1/2	2.7	4.5	6.7	1.8	3.0	4.5	2.1	3.5	5.3	2.0	3.3	4.9
2	1.6	2.6	3.9	1.1	1.8	2.7	1.3	2.1	3.1	1.3	2.1	3.1

For SI units: 1 foot = 304.8 mm, 1 ounce = 29.573 mL

TABLE 702.7.2(3)

LENGTH (FT) PER VOLUME OF PIPING

	PEX & PE-RT CTS SDR 9			PEX-AL-PEX (METRIC)			PE-AL-PE (METRIC)		
NOMINAL SIZE (inch)	**24 OZ**	**40 OZ**	**60 OZ**	**24 OZ**	**40 OZ**	**60 OZ**	**24 OZ**	**40 OZ**	**60 OZ**
1/4	79.1	131.9	197.8	NA	NA	NA	NA	NA	NA
3/8	37.5	62.5	93.8	40.7	67.8	101.8	40.7	67.8	101.8
1/2	20.4	33.9	50.9	19.6	32.7	49.0	19.6	32.7	49.0
3/4	10.2	17.0	25.5	7.3	12.2	18.3	7.3	12.2	18.3
1	6.2	10.3	15.5	4.5	7.4	11.2	4.5	7.4	11.2
1 1/4	4.1	6.9	10.3	2.8	4.6	6.9	2.8	4.6	6.9
1 1/2	3.0	4.9	7.4	1.7	2.9	4.3	1.7	2.9	4.3
2	1.7	2.9	4.3	1.0	1.7	2.6	1.0	1.7	2.6

For SI units: 1 foot = 304.8 mm, 1 ounce = 29.573 mL

TABLE 702.7.2(4)

LENGTH (FT) PER VOLUME OF PIPING

	PP SDR 6 (METRIC)			PP SDR 7.3 (METRIC)			PP SDR 11 (METRIC)[1]		
NOMINAL SIZE (inch)	**24 OZ**	**40 OZ**	**60 OZ**	**24 OZ**	**40 OZ**	**60 OZ**	**24 OZ**	**40 OZ**	**60 OZ**
1/4	NA	NA	NA	NA	NA	NA	NA	NA	NA
3/8	28.2	46.9	70.4	23.5	39.2	58.8	NA	NA	NA
1/2	17.7	29.6	44.3	14.7	24.4	36.6	NA	NA	NA
3/4	11.2	18.7	28.0	9.5	15.8	23.6	NA	NA	NA
1	6.9	11.6	17.3	5.7	9.5	14.2	NA	NA	NA
1 1/4	4.4	7.3	11.0	3.6	6.1	9.1	NA	NA	NA
1 1/2	2.8	4.6	6.9	2.3	3.9	5.8	NA	NA	NA
2	1.8	2.9	4.4	1.5	2.4	3.7	NA	NA	NA

For SI units: 1 foot = 304.8 mm, 1 ounce = 29.573 mL

[1] PP SDR 11 products are not typically used or rated at 180°F

Problem Statement: This public comment is intended to address the questions and concerns of the technical committee on the original proposals #143 and #010 respectively addressing the maximum

	volume of hot water in a fixture branch line. The original proposal seeks to acknowledge other basic plumbing design schemes that should not be limited to only 24 oz. as is currently the limit for a "single branch" serving only one end point plumbing fixture. By recognizing the advantage of multiple point draw usages off the same branch line using "flow-through" fitting configurations it is possible to save additional energy and water rather than each fixture being served by its own branch line. Additionally, water stagnation can be reduced if not eliminated entirely helping to address potential human health concerns. Supporting documentation in the form of schematic and pictorial illustrations are provided with this public comment and clearly identify the three basic types of fixture branches being covered in this proposal; Single Branch, Series Branch, and Ring Branch. The supporting documentation also includes photos of some typical flow-through fitting configurations to show this is not a specialized product but can be simply fabricated out of traditional "tees". Without defining "flow-through fittings" it is not possible to address "Series Branch "and "Ring Branch" volume limitations. The original proposal #143 added volume exceptions for the "Series Branch" and "Ring Branch" with the "Single Branch" limit already being specified in 702.7.1. Based upon input from the Technical Committee Section 702.7 has been revised to clearly define the three types of branches being discussed while leaving the existing exceptions stand with only minor revisions to reflect only volume limitations. Also, new volumes vs. length tables (702.8, 702.9, 702.10, and 702.11) are being proposed in this public comment for all piping materials currently shown in Table 702.7. Section 702.1 is being revised as part of this public comment for consistency purposes and to make reference to the new volume/length tables. These new tables will make it easier for plumbing inspectors to insure that piping lengths are not longer than allowable for the volume limitations of the type of branch being served. It should also be noted that existing Table 702.7 has some very minor revisions for consistency of how the volumes/foot were calculated based upon the piping standard's nominal dimensions using average OD and average wall thicknesses. Also ¼" nominal pipe sizes were added to this table. Actual flow testing was conducted at the Hot Water Research Lab of Southern California Gas Company's Energy Resource Center to insure wait times for hot water were not adversely affected with the increased volumes allowed for "Series Branch" and "Ring Branch". As a result of this testing, the original 80 oz. volume being proposed for "Ring Branch" is being reduced from 80 oz. to 60 oz. by this public comment. Your support is greatly appreciated.
Referenced Standards:	

WE-Stand 2017 – (Table A 104.2.1) Item # 156

<table>
<tr><td>Name:</td><td>Laura Allen</td></tr>
<tr><td>Organization:</td><td>Greywater Action</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Recommendation:</td><td>Delete text</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Section Number:</td><td>Table A 104.2.1</td></tr>
<tr><td>Proposed Text:</td><td>
<table>
<tr><th colspan="2">TABLE A 104.2.1
MINIMUM WATER QUALITY</th></tr>
<tr><td>Escherichia coli (fecal coliform):</td><td>Non-detectable</td></tr>
<tr><td>~~Protozoan Cysts:~~</td><td>~~Non-detectable~~</td></tr>
<tr><td>~~Viruses:~~</td><td>~~Non-detectable~~</td></tr>
<tr><td>Turbidity:</td><td><0.3 NTU</td></tr>
</table>
</td></tr>
<tr><td>Problem Statement:</td><td>Testing for protozoan cysts and viruses is incredibly expensive and won't ensure the water system is safe. This regulation should require the use of adequate filtration and disinfection to ensure the water is safe, and NOT require any testing of cysts or viruses. There are over 300,000 types of viruses that infect mammals, and at least 12 common human waterborne disease viruses. Just to test for 2 highly common viruses, norovirus and enterovirus, would cost around $2,5000 per sample. Common cysts- giardia and cryptosporidium cost over $500 per sample. Any treatment system should be certified to remove these viruses and cysts.</td></tr>
<tr><td>Referenced Standards:</td><td></td></tr>
</table>

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 25, NEGATIVE: 1, NOT RETURNED: 2 Gray, Tabakh

COMMENT ON AFFIRMATIVE:
MAJEROWICZ: $2,5000 must be a misprint

EXPLANATION OF NEGATIVE:
MANN: I for one have never put cost above health and safety. It appears this proponent does.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (Table A 104.2.1) Item #156

Name:	Cambria McLeod
Organization:	Kohler Co

Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	Table A 104.2.1
Proposed Text:	
Problem Statement:	Item # 156 proposes to revise Table A 104.2.1, removing minimal water quality requirements. This is an important health and safety provision for a potable water system and should remain.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (Table A 104.2.1) Item #156

Name:	Matt Sigler
Organization:	PMI
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	Table A 104.2.1
Proposed Text:	
Problem Statement:	PMI requests that Item #156 be rejected. The purpose for this table is to provide the AHJ with minimum water quality requirements for a private potable rainwater catchment system to protect public health and safety. No technical documentation was provided by the proponent to show that public health and safety would not be jeopardized by eliminating the test parameters for cysts and viruses from the table.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 3:

WE-Stand 2017 – (Table A 104.2.1) Item # 156

Name:	H.W. (Bill) Hoffman
Organization:	H.W. (Bill) Hoffman & Assoc.
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	Table A. 104.2.1
Proposed Text:	

Problem Statement:	The only system that I know of to remove viruses is reverse osmosis. This section needs to be reconsidered and if no other alternative is available, I say keep the testing.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 4:

WE-Stand 2017 – (Table A 104.2.1) Item #156

Name:	John Koeller
Organization:	Koeller and Company
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	Table A104.2.1
Proposed Text:	
Problem Statement:	The proponent's last statement in Item 156, "Any treatment system should be certified to remove these viruses and cysts", would require "these viruses and cysts" to remain listed in the Table so that they can be referenced to a certified treatment system and verify that the treatment system does remove these viruses and cysts. This is an important health and safety provision for a potable water system and should remain.
Referenced Standards:	

WE-Stand 2017 – (A 104.2.3) Item # 157

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Delete text
Section Number:	A 104.2.3
Proposed Text:	~~**A 104.2.3 Maintenance.** Normal system maintenance shall require system testing every 3 months in accordance with Table A 104.2.3. Upon failure of the fecal coliform test, system shall be re-commissioned involving cleaning, and retesting in accordance with section A104.2.~~
Problem Statement:	Rational: After initial testing the maintenance and monitoring should be left to the system owner. There are no similar requirements for owners of drinking water wells and to place more testing requirements on a rainwater systems owner places an unfair burden upon them. They SHOULD be required to upkeep their filtration and disinfection system, which would prevent potential issues with water quality. Testing every 3 months, or annually, is not helpful or necessary.
Referenced Standards:	

Staff note. This will also delete Table A104.2.3. As such this proposal should be heard at the same time with Item #158.

TC ACTION:
Reject

TC SUBSTANTIATON:
Maintenance testing is important in order to help protect the health of users of this water.

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 23, NEGATIVE: 2, NOT RETURNED: 3 Gray, Sovocool, Tabakh

EXPLANATION OF NEGATIVE:
KRAUSE: Agree with problem statement.
SHAPIRO: Less oversight is needed, leave it to property owner.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (A 104.2.3) Item # 157

Name:	Thomas Pape
Organization:	AWE / BMP

Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	A 104.2.3
Proposed Text:	**A 104.2.3 Maintenance.** Normal system maintenance shall require system testing for Escherichia coli (fecal coliform) and turbidity every 3 months in accordance with Table A 104.2.3. Upon failure of the fecal coliform test, system shall be re-commissioned involving cleaning, and retesting in accordance with section A104.2. Testing for viruses and cysts shall occur once after 3 months of initial operation and once every 12 months thereafter. **EXCEPTION**: Upon failure of the virus or cyst test, the tests will be repeated every 3 months until the tests results are negative for two consecutive tests.
Problem Statement:	The cost of testing should neither be onerous or the basis to eliminate testing. This comment provides reasonable testing requirements.
Referenced Standards:	

WE-Stand 2017 – (A 104.3.1) Item # 159

Name:	Laura Allen
Organization:	Greywater Action
Recommendation:	Revise text
Section Number:	A 104.3.1
Proposed Text:	**A 104.3.1 Filtration Devices.** Potable water filters shall comply with NSF 53 and shall be installed in accordance with manufacturer's instructions. A minimum of two inline filters, one 5 micron filter followed by one 0.5-1 micron filter shall be installed prior to the disinfection system.
Problem Statement:	Rational: Rather than requiring expensive testing for viruses and cysts the code should require filters and disinfection that will remove them to ensure the long-term potable quality of the water.
Referenced Standards:	

Note: NSF53-2014 meets the requirements for a mandatory reference standard in accordance with Section 15.0 of the Regulations Governing Consensus Development of the Water Efficiency and Sanitation Standard.

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 25, NEGATIVE: 1, NOT RETURNED: 2 Gray, Tabakh

EXPLANATION OF NEGATIVE:
MANN: The proponent is stating that the two filters will remove viruses and cysts. There is no documentation that this statement is accurate.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (A 104.3.1) Item #159

Name:	Cambria McLeod
Organization:	Kohler Co
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	A 104.3.1

Proposed Text:	
Problem Statement:	The code change proposes inline filters to remove viruses and cysts in lieu of testing. This is an unsupported claim and poses a risk to health and safety.
Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (A 104.3.1) Item #159

Name:	Matt Sigler
Organization:	PMI
Recommendation:	Request to reject the code change proposal by this public comment.
Section Number:	A 104.3.1
Proposed Text:	
Problem Statement:	PMI requests that Item #159 be rejected. No technical documentation was provided by the proponent to show that the proposed filters would be capable of removing cysts and viruses. Furthermore, water quality testing is important for ensuring that public health and safety is not jeopardized.
Referenced Standards:	

WE-Stand 2017 – (414.X) TC Proposal # 6

Name:	WE-Stand Technical Committee
Recommendation:	Add text
Section Number:	414.X
Task Group Recommendation:	**414.X Irrigation Flow Sensing System.** On commercial landscape irrigation systems, an irrigation flow sensing system shall be installed that shall interface with the control system to suspend irrigation for abnormal flow conditions. If equipped with totalizer capabilities, the irrigation flow sensing system shall also function as a meter for irrigation water.
Problem Statement:	An irrigation flow sensing system in combination with a controller can suspend the irrigation system or irrigation zone when there are flows that are considered abnormal such as a missing nozzle, broken sprinkler or broken pipe. If the flow sensor is equipped with a totalizer then it can also function as a meter for irrigation water.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 25, NOT RETURNED: 2 Gray, Saltzberg, Tabakh

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT:

WE-Stand 2017 – (414.X) Item TC Proposal #6

Name:	Ron Wolfarth
Organization:	Rain Bird Corporation
Recommendation:	Request to accept the code change proposal as submitted by this public comment.
Section Number:	414.X
Proposed Text:	
Problem Statement:	This public comment accepts the text that was proposed by the Task Group led by Brent Mecham and was approved unanimously by the Technical Committee. Problem: Much water can be lost when there is an irrigation system failure due to broken or leaking pipes or malfunctioning equipment like a stuck control valve or broken sprinkler. An irrigation flow sensing system in combination with a controller equipped to manage the information from a flow sensor can suspend irrigation and sometimes, depending on the system chosen, alert

	the operator to the fault. If the system is equipped with a master valve at the point of connection, it can turn off water when there is a broken main line or a stuck valve.
Referenced Standards:	

Staff Note: This would become Section 414.6 and renumber remaining sections.

Name:	WE-Stand Technical Committee
Recommendation:	Add text
Section Number:	Appendix X – new Appendix

Task Group Recommendation:

Appendix X

Design of the Water Distribution System for Residential Dwellings with Efficient Plumbing Fixtures

X 101.0 General.
X 101.1 Applicability. The intent of this appendix is to provide a method for sizing a water supply distribution system for single- and multi-family dwellings with efficient water-conserving plumbing fixtures, fixture fittings, and appliances.

X 102.0 Design Criteria
X 102.1 Fixtures. Plumbing fixtures, fixture fittings, and appliances shall not exceed the flow rate and flush volume in Table X 102.1.
X 102.2 Sizing Method. The water distribution system shall be sized in accordance with Section X 102.2.1 through X 102.2. 5.
X 102.2.1 Meter, Building Supply and Branches. The estimated design flow rate for the water meter, building supply, and branches shall be directly calculated using Equation X 102.2.1 and rounded to the nearest whole number. See [hyperlink] for a downloadable sizing calculator in Microsoft Office Excel file as seen in the sizing example below. The number of each kind of fixtures or fixture groups shall be counted in the spreadsheet. The flow rate (q) and probability (p) values for the Equation X 102.2.1 shall not exceed the design values in Table X 102.1
X 102.2.2 Fixture Branches and Fixture Supplies. The flow rate for one fixture branch and fixture supply shall be the design flow rate of the fixture using Table X 102.1. Where the maximum fixture flow rate is less than the design flow rate in Table X 102.1, the lesser flow rate shall be permitted. Where the demand calculated with Equation X 102.2.1 for a supply branch serving two fixture branches is greater than the sum of the two fixture's maximum flow rate, the sum shall be used for the supply branch flow rate. Rounding shall be to the nearest whole number.
X 102.2.3 Sizing for Velocity. The estimated design flow rate for the building supply, branches and fixture supplies shall not exceed ten feet per second (10 ft/sec). Velocity limitations for the cold and hot water supply pipe diameters shall be applied to Table X 102.2.3 or shall be in accordance with the manufacturer's specifications for the type of pipe material.
X 102.2.4 Pressure Loss Due to Pipe Friction. Pressure loss due to pipe friction shall be determined by accepted Engineering calculations. Accepted Engineering calculations include the Hazen-Williams and the Darcy-Weisbach formulae.
X 102.2.5 Continuous Supply Demand. Continuous supply demands in gallons per minute (gpm) for lawn sprinklers, air conditioners, etc., shall be added to the total estimated demand for the Building Supply.
X 102.2.6 Other Fixtures. Fixtures not included in Table X 102.1 shall have the design flow rate specified by the manufacturer. The p-value shall approximate the design p-value of a fixture having a similar frequency of use in Table X 102.1.

$$Q_{0.99} = \frac{1}{1-P_0}\left[\sum_{k=1}^{K} n_k p_k q_k + (z_{0.99})\sqrt{\left[(1-P_0)\sum_{k=1}^{K} n_k p_k (1-p_k) q_k^2\right] - P_0\left(\sum_{k=1}^{K} n_k p_k q_k\right)^2}\right]$$ (Equation X 102.2.1)

Where: $Q_{0.99}$ = estimated design flow rate (gpm) in the 99th percentile
q = design flow rate of an individual fixture (Table X 102.1)
n = number of fixtures of the same kind
K = number of distinct fixture groups (as listed in Table X 102.1)
p = probability of single fixture use (design p-value in Table X 102.1)
P_0 = probability of no flow given by $(1-p_1)^{n_1}(1-p_2)^{n_2}\cdots(1-p_K)^{n_K}$
$z_{0.99}$ = 99th percentile of the standard normal distribution (z = 2.33)

Table X 102.1
Design Parameters for Water-Conserving Plumbing Fixtures in Residential Occupancies

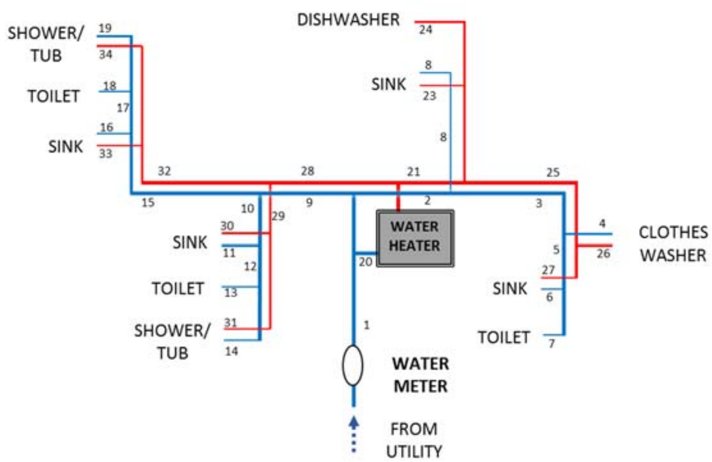
FIXTURE	DESIGN FLOW RATE (GPM)	DESIGN P-VALUE
Shower	2.0	0.025
Combination Tub/Shower	4.5	0.030
Tub Filler – Standard Standalone Bathtub[1]	7.0	0.005
Water Closet Gravity Tank – 1.28gpf	4.0	0.010
Lavatory Faucet	1.5	0.025
Kitchen Faucet	2.2	0.025
Dishwasher[2]	1.6	0.005
Clothes Washer[2]	4.5	0.050
Laundry Faucet (with aerator)	2.0	0.025
Bathroom Group – Lavatory, Water Closet, Combination Tub/Shower	7.0	0.065
Kitchen Group – Kitchen Faucet , Dishwasher	3.8	0.030

[1] For high-flow tub fillers, the design flow rate shall be determined by the fixture fitting flow rate specification. The high-flow tub fixture shall not be subject to a fixture-use probability to determine pipe size.
[2] Clothes Washers and dishwashers shall have an Energy Star label.

Table X 102.2.3
Maximum Flow Rate (gpm) for Pipe Diameters
(Smooth pipe – L-copper)

Maximum Flow Rate at 5 f/s						
3/8	**1/2**	**3/4**	**1**	**1 1/4**	**1 1/2**	**2**
2	4	8	13	20	28	48
Maximum Flow Rate at 8 f/s						
3/8	**1/2**	**3/4**	**1**	**1 1/4**	**1 1/2**	**2**
4	6	12	21	31	44	77
Maximum Flow Rate at 10 f/s						
3/8	**1/2**	**3/4**	**1**	**1 1/4**	**1 1/2**	**2**
5	7	15	26	39	55	97

Figure X 102.2 Example Illustrating the Sizing Method



Pipe Section	Flow Rate gpm	Pipe Diameter (nominal inches)
1	12	3/4
2	7	3/4
3	7	3/4
4	4.5	1/2
5	5	1/2
6	1.5	3/8
7	4	3/8
8	2.2	3/8
9	10	3/4
10	7	3/4
11	1.5	3/8
12	5	1/2
13	4	3/8
14	4.5	1/2
15	7	3/4
16	1.5	3/8
17	5	1/2
18	4	3/8
19	4.5	1/2
20	8	3/4
21	7	3/4
22	4	3/8
23	2	3/8
24	1.6	3/8
25	6	1/2
26	4.5	1/2
27	1.5	3/8
28	7	3/4
29	6	1/2
30	1.5	3/8
31	4.5	1/2
32	6	1/2
33	1.5	3/8
34	4.5	1/2

Sizing for Pipe Section 1 – Building Supply

Fixture type	n Count	p Probability	q Flow rate gpm	npq Mean Flow gpm	np(1-p)q^2 Flow variance $(gpm)^2$	Po Prob. No flow	Max pc
Shower	0	0.025	2.0	0.0000	0.0000	1.0000	
Tub/Shower Combo	0	0.030	4.5	0.0000	0.0000	1.0000	
Tub Filler - Stand alone Bathtub	0	0.005	7.0	0.0000	0.0000	1.0000	
Water Closet, Gravity Tank	1	0.010	4.0	0.0400	0.1584	0.9900	
Lavatory Faucet	1	0.025	1.5	0.0375	0.0548	0.9750	
Kitchen Sink Faucet	0	0.025	2.2	0.0000	0.0000	1.0000	
Dishwasher	0	0.005	1.6	0.0000	0.0000	1.0000	
Clothes washer	1	0.050	4.5	0.2250	0.9619	0.9500	
Laundry Sink Faucet	0	0.025	2.0	0.0000	0.0000	1.0000	
Bathroom Group	2	0.065	7.0	0.9100	5.9560	0.8742	
Kitchen Group	1	0.030	3.8	0.1140	0.4202	0.9700	
Total	**6**			**1.3265**	**7.5513**	**0.7776**	
			Busy time	**5.9646**	**6.2899**		
Z value	2.326						
Demand Q	**12**	**gpm**					

1. In the second column (n), list the number of bathroom groups and kitchen groups for the whole house. List additional fixtures that are not included in the groups. The spreadsheet will automatically calculate the demand (Q) for the Building Supply.
2. Add any continuous supply demands to the peak demand estimate.
3. Use Table X 102.2.3 to determine the pipe diameter. At 8 ft/sec, the pipe diameter for 12 gpm is ¾-inch.

Sizing for Pipe Section 2 – Cold Water Supply Branch

Fixture type	n Count	p Probability	q Flow rate gpm	npq Mean Flow gpm	np(1-p)q^2 Flow variance $(gpm)^2$	Po Prob. No flow	nq Max possible flow gpm
Shower	0	0.025	2.0	0.0000	0.0000	1.0000	0.0
Tub/Shower Combo	0	0.030	4.5	0.0000	0.0000	1.0000	0.0
Tub Filler - Stand alone Bathtub	0	0.005	7.0	0.0000	0.0000	1.0000	0.0
Water Closet, Gravity Tank	1	0.010	4.0	0.0400	0.1584	0.9900	4.0
Lavatory Faucet	1	0.025	1.5	0.0375	0.0548	0.9750	1.5
Kitchen Sink Faucet	1	0.025	2.2	0.0550	0.1180	0.9750	2.2
Dishwasher	0	0.005	1.6	0.0000	0.0000	1.0000	0.0
Clothes washer	1	0.050	4.5	0.2250	0.9619	0.9500	4.5
Laundry Sink Faucet	0	0.025	2.0	0.0000	0.0000	1.0000	0.0
Bathroom Group	0	0.065	0.0	0.0000	0.0000	1.0000	0.0
Kitchen Group	0	0.030	0.0	0.0000	0.0000	1.0000	0.0
Total	**4**			**0.3575**	**1.2931**	**0.8941**	**12.2**
			Busy time	**3.3746**	**2.0245**		
Z value	2.326						
Demand Q	**7**	**gpm**					

1. In the second column (n), list the number of fixtures for the cold water supply for Pipe Section 2. The cold water supply at Pipe Section 2 serves (1) water closet, (1) lavatory faucet, (1) kitchen faucet, and (1) clothes washer. The spreadsheet will automatically calculate the demand (Q) for the cold water branch.
2. Use Table X 102.2.3 to determine the pipe diameter. At 8 ft/sec, the pipe diameter for 7 gpm is ¾-inch.

Sizing for Pipe Section 28 – Hot Water Supply Branchnc

Fixture type	n Count	p Probability	q Flow rate gpm	npq Mean Flow gpm	np(1-p)q^2 Flow variance $(gpm)^2$	Po Prob. No flow	nq Max possible flow gpm
Shower	0	0.025	2.0	0.0000	0.0000	1.0000	0.0
Tub/Shower Combo	2	0.030	4.5	0.2700	1.1786	0.9409	9.0
Tub Filler - Stand alone Bathtub	0	0.005	7.0	0.0000	0.0000	1.0000	0.0
Water Closet, Gravity Tank	0	0.010	4.0	0.0000	0.0000	1.0000	0.0
Lavatory Faucet	2	0.025	1.5	0.0750	0.1097	0.9506	3.0
Kitchen Sink Faucet	0	0.025	2.2	0.0000	0.0000	1.0000	0.0
Dishwasher	0	0.005	1.6	0.0000	0.0000	1.0000	0.0
Clothes washer	0	0.050	4.5	0.0000	0.0000	1.0000	0.0
Laundry Sink Faucet	0	0.025	2.0	0.0000	0.0000	1.0000	0.0
Bathroom Group	0	0.065	0.0	0.0000	0.0000	1.0000	0.0
Kitchen Group	0	0.030	0.0	0.0000	0.0000	1.0000	0.0
Total	**4**			**0.3450**	**1.2882**	**0.8944**	**12.0**
			Busy time	**3.2684**	**2.6495**		
Z value	2.326						
Demand Q	**7**	**gpm**					

h

1. In the second column (n), list the number of fixtures for the hot water supply for Pipe Section 28. The hot water supply at Pipe Section 28 serves (2) combination tub and showers and (2) lavatory faucets. The spreadsheet will automatically calculate the demand (Q) for the hot water branch.

Use Table X 102.2.3 to determine the pipe diameter. At 8 ft/sec, the pipe diameter for 7 gpm is ¾-inch.

Problem Statement:

The computational method presented in Equation X 102.2.1 is the result of a task group five-year study reported in a peer-reviewed unpublished paper (provided upon request). The peer review affirmed the soundness of the statistical method. The input parameters for the equation are the number of fixtures (n), fixture flow rates (q), and the probability of fixture use (p). These parameters were derived from a large U.S. database for residential end use of water (Aquacraft, Inc.). A database comprising of over 1000 homes was specially developed for the purpose of querying probabilities and flow rates for various levels of fixture water efficiencies. The fixture probabilities and flow rates in Table X 102.1 are derived from queries for efficient fixture flow rates and probability of use during peak hours.

Similar to the criterion used by Dr. Hunter, the estimated peak demand is the 99th percentile (Q_{99}) of all water demands expected at the residence during the design hour. The 99th percentile means there is only a one percent chance that the actual demand will exceed the design demand during the peak hour of water use in the residence. Exceeding the design demand in residential dwellings does not impose severity upon the plumbing system. The efficient fixtures are purposely designed for flows with low intensity and short duration. Exceeding the demand may slightly

	lengthen the flow duration or slightly reduce the flow rate at the fixture. These effects would probably be imperceptible to the user. The equation works efficiently in an Excel spreadsheet that will be provided for the user by means of a www.link to a downloadable spreadsheet. Snapshots of the spreadsheet are provided in the Example. The values in Table X 102.1 are provided in the spreadsheet, and the only variable the user needs to provide is the number of plumbing fixtures (n) in column 2 of the form. The information in the spreadsheet columns may be useful to the user when needing to evaluate the mean flow rate, the variance, the probability of no flow, and the maximum possible flow if all the fixtures are flowing at the same time. The data shows that simultaneous is infrequent in single family homes as reflected in the spreadsheet calculator. The pipe sizing process is simplified based on velocity limitations. The spreadsheet calculator will provide the estimated demand for all branches in the plumbing system following the provisions in Sections X 102.2.1 and X 102.2.2 as well as the Example. The demand will determine the pipe size according to the velocity requirements shown in Table X 102.2.3. Similar tables can be created for other pipe material using the Hazen-Williams or Darcy-Weisbach formulae. An example of pipe sizing is provided to demonstrate how the spreadsheet calculator works with the velocity table. The velocity table has three variations: for hot water limitations, especially for a circulation system (5 ft/sec); for copper piping systems (8 ft/sec); and for CPVC and PEX according to manufacturer's specifications not to exceed 10 ft/sec. In comparison to the UPC pipe sizing method in Chapter 6, the Example shows pipe reductions for the building water supply and meter, and fixture branches with 3/8-inch diameter. The pipe sizing table justifies the increasing use of 3/8-inch diameter pipe for fixture branches because of the low-flow efficient fixtures. The proof of the adequacy of the proposed method of estimating the demand loads to be expected in residential water-supply systems will, in the end, depend on its success in actual trial over a period of years. Dr. Hunter expressed the same thing when he promoted his curve in 1940. The Hunter method has proven successful with a sparse sample of wake up calls to hotel guests. The proposed method has greater confidence based on 863,000 water use events during 11,385 home-days of monitoring over 1,000 homes. The proposal is recommended for the UPC Appendix as an alternate pipe sizing method for single- and multi-family applications with high-efficiency plumbing fixtures and appliances. The method proposes adequate pipe sizing without excessiveness and may be a factor toward mitigating pathogens due to stagnation. Maintaining the design flow rates at the recommended velocities will ensure pipe scouring that is vital in reducing biofilms. The pipe sizing task group has made every effort to consider adequate sizing for satisfactory use for the residential water supply system.
Referenced Standards:	

TC ACTION:
Accept

TOTAL ELIGIBLE TO VOTE: 28

VOTING RESULTS: AFFIRMATIVE: 24, NEGATIVE: 2, NOT RETURNED: 2 Gray, Tabakh

COMMENT ON AFFIRMATIVE:
KRAUSE: Title does not appear to fit code style, Recommend changing from: Design of the Water Distribution System for Residential Dwellings with Efficient Plumbing Fixtures to: Water Distribution System Design for Residential Dwellings with Efficient Plumbing Fixtures.

EXPLANATION OF NEGATIVE:

MANN: A similar proposal was submitted to the UPC Technical Committee and rejected. The peer reviewed unpublished paper was not provided to the committee. Only available upon request.
TINDALL: Water flows and pipe sizes should be handled in the UPC.

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 1:

WE-Stand 2017 – (Appendix X) Item # TC Proposal 9

Name:	Steven Buchberger
Organization:	IAPMO Pipe Size Task Group
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	Appendix X

Proposed Text:

Add this note beneath the Title of this Appendix:

(This appendix is based on the technical paper entitled, "Peak Water Demand Study." A copy of the paper is available for download at http://www.iapmo.org/WESTAND/Pages/DocumentInformation.aspx)

N 101.0 General.

N 101.1 Applicability. ~~The intent of~~ ~~t~~This appendix ~~is to~~ provides a method for estimating the demand load for the building water supply and principal branches ~~sizing a water supply distribution system~~ for single- and multi-family dwellings with ~~efficient~~ water-conserving plumbing fixtures, fixture fittings, and appliances.

N 102.0 ~~Design Criteria~~ Demand Load.

N 102.1 Water-Conserving Fixtures. Plumbing fixtures, fixture fittings, and appliances shall not exceed the design flow rate ~~and flush volume~~ in Table N 102.1.

N 102.2 ~~Sizing Method~~ Water Demand Calculator. ~~The water distribution system shall be sized in accordance with Section N 102.2.1 through Section N 102.2. 5.~~ The estimated 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 http://www.iapmo.org/WESTAND/Pages/DocumentInformation.aspx.

N 102.~~2.1~~3 Meter~~,~~ and Building Supply ~~and Branches~~. To determine ~~T~~the ~~estimated~~ design flow rate for the water meter~~,~~ and building supply, enter the total number of indoor plumbing fixtures and appliances for the building in Column [B]of the Water Demand Calculator and run Calculator. See Table N 102.3 for an example. ~~and branches shall be calculated using Equation N 102.2.1(1) and rounded to the nearest whole number. The number of each kind of fixtures or fixture groups shall be counted in the spreadsheet. The flow rate (q) and probability (p) values for the Equation N 102.2.1 shall not exceed the design values in Table N 102.1~~

N 102.~~2.2~~4 Fixture Branches and Fixture Supplies. To determine the design flow rate for fixture branches and risers, enter the number of plumbing fixtures and appliances for the fixture branch or riser in Column [B] of the Water Demand Calculator and run Calculator. The flow rate for one fixture branch and one fixture supply shall be the design flow rate of the fixture according to ~~using~~ Table N 102.1. ~~Where the maximum fixture flow rate is less than the design flow rate in Table N 102.2.1(1), the lesser flow rate shall be permitted. Where the demand calculated with Equation N 102.2.1(1) for a supply branch serving two fixture branches is greater than the sum of the two fixture's maximum flow rate, the sum shall be used for the supply branch flow rate. Rounding shall be to the nearest whole number.~~

~~**N 102.2.3 Sizing for Velocity.** The estimated design flow rate for the building supply, branches and fixture supplies shall not exceed 10 feet per second (ft/sec) (3.0 m/s). Velocity limitations for the cold and~~

~~hot water supply pipe diameters shall be applied to Table N 102.2.3 or shall be in accordance with the manufacturer's specifications for the type of pipe material.~~

~~**N 102.2.4 Pressure Loss Due to Pipe Friction.** Pressure loss due to pipe friction shall be determined by accepted engineering calculations. Accepted engineering calculations include the Hazen-Williams and the Darcy-Weisbach formulae.~~

N 102.~~2.~~5 Continuous Supply Demand. Continuous supply demands in gallons per minute (gpm) ~~(L/s)~~ for lawn sprinklers, air conditioners, silcocks, etc., shall be added to the total estimated demand for the building supply as determined by Section N 102.3. Where there is more than one silcock installed on the plumbing system, the demand for only one silcock shall be added to the total estimated demand for the building supply. Where a silcock is installed on a fixture branch, the demand of the silcock shall be added to the design flow rate for the fixture branch as determined by Section N 102.4.

N 102.~~2.~~6 Other Fixtures. Fixtures not included in Table N 102.1 shall be added in Rows 12 through 14 in the Water Demand Calculator as Other Fixture. ~~have the design flow rate specified by the manufacturer. The p-value shall approximate the design p-value of a fixture having a similar frequency of use in Table N 102.1.~~ The probability of use and flow rate for Other Fixtures shall be added by selecting a comparable probability of use and flow rate from Columns [C] and [E].

N 102.7 Size of Water Piping per Appendix A. Except as provided in Section N 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. After determining the permissible friction loss per 100 feet of pipe in accordance with Section A 104.0 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), or Chart A 105.1(4), whichever is applicable, in accordance with Section A 105.0 and Section A 106.0. Velocities shall be in accordance with Section A 107.0. Appendix I, Figure 3 and Figure 4 shall be permitted when sizing PEX systems.

$$Q_{0.99} = \frac{1}{1-P_0}\left[\sum_{k=1}^{K} n_k p_k q_k + (z_{0.99})\sqrt{\left[(1-P_0)\sum_{k=1}^{K} n_k p_k q_k\right] - P_0\left(\sum_{k=1}^{K} n_k p_k q_k\right)^2}\right]$$

~~[Equation N 102.2.1(1)]~~

~~$(1 - p_1)^{n1} (1 - p_2)^{n2} \cdots (1 - p_K)^{nk}$~~ ~~[Equation N 102.2.1(2)]~~

~~Where:~~

~~$Q_{0.99}$ = estimated design flow rate in the 99th percentile, (gpm) (L/s)~~

~~q = design flow rate of an individual fixture (Table N 102.1), (gpm) (L/s)~~

~~n = number of fixtures of the same kind~~

~~K = number of distinct fixture groups as listed in Table N 102.1~~

~~P = probability of single fixture use (design p-value in Table N 102.1)~~

~~P_0 = probability of no flow given by Equation N 102.2.1(2)~~

~~$z_{0.99}$ = 99th percentile of the standard normal distribution (z = 2.33)~~

TABLE N 102.1
DESIGN ~~PARAMETERS~~ FLOW RATES FOR WATER-CONSERVING PLUMBING FIXTURES AND APPLIANCES IN RESIDENTIAL OCCUPANCIES

FIXTURE AND APPLIANCE	MAXIMUM DESIGN FLOW RATE (gallons per minute)
Bar Sink	1.5
Bathtub	5.5
Bidet	2.0
Clothes Washer[1]	3.5
Combination Bath/Shower	5.5
Dishwasher[1]	1.3
Kitchen Faucet	2.2

Laundry Faucet (with aerator)	2.0
Lavatory Faucet	1.5
Shower, per head	2.0
Water Closet, 1.28 GPF Gravity Tank	3.0

For SI units: 1 gallon per minute = 0.06 L/s
[1]Clothes washers and dishwashers shall have an energy star label.

FIXTURE	DESIGN FLOW RATE (gallons per minute)	DESIGN P VALUE
Shower	2.0	0.025
Combination Tub/Shower	4.5	0.030
Tub Filler – Standard Standalone Bathtub[1]	7.0	0.005
Water Closet Gravity Tank – 1.28gpf	4.0	0.010
Lavatory Faucet	1.5	0.025
Kitchen Faucet	2.2	0.025
Dishwasher[2]	1.6	0.005
Clothes Washer[2]	4.5	0.050
Laundry Faucet (with aerator)	2.0	0.025
Bathroom Group – Lavatory, Water Closet, Combination Tub/Shower	7.0	0.065
Kitchen Group – Kitchen Faucet , Dishwasher	3.8	0.030

For SI units: 1 gallon per minute = 0.06 L/s
[1]For high-flow tub fillers, the design flow rate shall be determined by the fixture fitting flow rate specification. The high-flow tub fixture shall not be subject to a fixture-use probability to determine pipe size.
[2]Clothes washers and dishwashers shall have an energy star label.

Table N 102.3
Water Demand Calculator Example

	[A] FIXTURE	[B] ENTER NUMBER OF FIXTURES	[C] PROBABILITY OF USE (%)	[D] ENTER FIXTURE FLOW RATE (GPM)	[E] MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
1	Bar Sink	0	2.0	1.5	1.5
2	Bathtub	0	1.0	5.5	5.5
3	Bidet	0	1.0	2.0	2.0
4	Clothes Washer	1	5.5	3.5	3.5
5	Combination Bath/Shower	1	5.5	5.5	5.5
6	Dishwasher	1	0.5	1.3	1.3
7	Kitchen Faucet	1	2.0	2.2	2.2
8	Laundry Faucet	0	2.0	2.0	2.0
9	Lavatory Faucet	1	2.0	1.5	1.5
10	Shower, per head	0	4.5	2.0	2.0
11	Water Closet, 1.28 GPF Gravity Tank	1	1.0	3.0	3.0
12	Other Fixture 1	0	0.0	0.0	6.0
13	Other Fixture 2	0	0.0	0.0	6.0
14	Other Fixture 3	0	0.0	0.0	6.0

Total Number of Fixtures 6

99th PERCENTILE DEMAND FLOW = 8.5 GPM

RESET

RUN WATER DEMAND CALCULATOR

TABLE N 102.2.3
MAXIMUM FLOW RATE (GPM) FOR PIPE DIAMETERS (inches) AND DRAINAGE FIXTURE UNIT VALUES (DFU) (SMOOTH PIPE – L-COPPER)

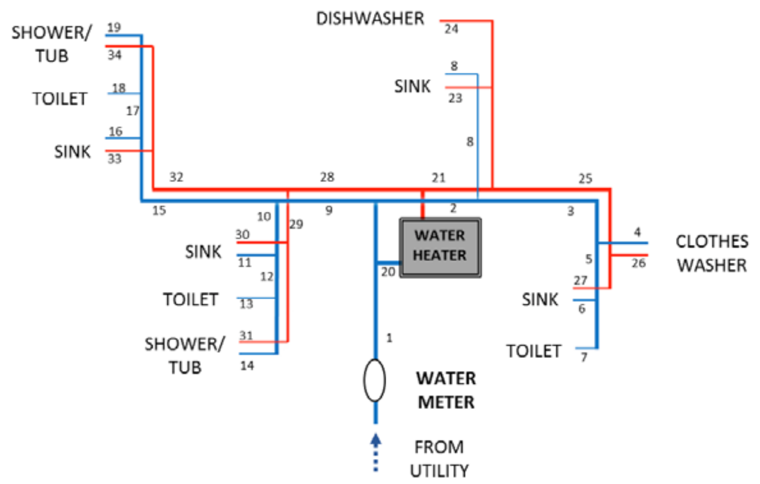
MAXIMUM FLOW RATE AT 5 ft/s						
⅜	½	¾	1	1¼	1½	2
2	4	8	13	20	28	48
MAXIMUM FLOW RATE AT 8 (feet per second)						

⅜	½	¾	1	1¼	1½	2
4	6	12	21	31	44	77
MAXIMUM FLOW RATE AT 10 (feet per second)						
⅜	½	¾	1	1¼	1½	2
5	7	15	26	39	55	97

For SI units: 1 foot per second = 0.3 m/s, 1 inch = 25 mm

N 103.0 Sizing Example.

N 103.1 Sizing Meters, Building Supply and Branches. See Example N 103.1(1) and Table N 103.1(1) through Table N 103.1(4) for examples on using Equation N 102.2.1(1).



EXAMPLE N 103.1(1)
ILLUSTRATING THE SIZING METHOD USING EQUATION N 102.2.1

TABLE N 103.0(1)
EXAMPLE ILLUSTRATING THE SIZING METHOD

PIPE SECTION	FLOW RATE (gallons per minute)	PIPE DIAMETER (nominal inches)
1	12	¾
2	7	¾
3	7	¾
4	4.5	½
5	5	½
6	1.5	⅜
7	4	⅜
8	2.2	⅜
9	10	¾
10	7	¾
11	1.5	⅜
12	5	½
13	4	⅜
14	4.5	½
15	7	¾
16	1.5	⅜
17	5	½
18	4	⅜
19	4.5	½
20	8	¾
21	7	¾

22	4	3/8
23	2	3/8
24	1.6	3/8
25	6	1/2
26	4.5	1/2
27	1.5	3/8
28	7	3/4
29	6	1/2
30	1.5	3/8
31	4.5	1/2
32	6	1/2
33	1.5	3/8
34	4.5	1/2

For SI units: 1 gallon per minute = 0.06 L/s, 1 inch = 25 mm

TABLE N 103.0(2)
SIZING FOR PIPE SECTION 1 – BUILDING SUPPLY[1, 3]

FIXTURE TYPE	*n*	*p*	*q*	*npq*	*np(1-p)q*^2	*Po*	*nq*
	COUNT	PROBABILITY	FLOW RATE (gallons per minute)	MEAN FLOW (gallons per minute)	FLOW VARIANCE (gallons per minute)[2]	PROBABILITY OF NO FLOW	MAX POSSIBLE FLOW (gallons per minute)
Shower	0	0.025	2.0	0.0000	0.0000	1.0000	0.0
Tub/Shower Combo	0	0.030	4.5	0.0000	0.0000	1.0000	0.0
Tub Filler – Stand Alone Bathtub	0	0.005	7.0	0.0000	0.0000	1.0000	0.0
Water Closet, Gravity Tank	1	0.010	4.0	0.0400	0.1584	0.9900	4.0
Lavatory Faucet	1	0.025	1.5	0.0375	0.0548	0.9750	1.5
Kitchen Sink Faucet	0	0.025	2.2	0.0000	0.0000	1.0000	0.0
Dishwasher	0	0.005	1.6	0.0000	0.0000	1.0000	0.0
Clothes Washer	1	0.050	4.5	0.2250	0.9619	0.9500	4.5
Laundry Sink Faucet	0	0.025	2.0	0.0000	0.0000	1.0000	0.0
Bathroom Group	2	0.065	7.0	0.9100	5.9560	0.8742	14.0
Kitchen Group	1	0.030	3.8	0.1140	0.4202	0.9700	3.8
Total	**6**			**1.3265**	**7.5513**	**0.7776**	**27.8**
			Busy time	**5.9646**	**6.2899**		
z value	2.326						
Demand Q	**12**	**gpm**					

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

[1] In the second column (n), list the number of bathroom groups and kitchen groups for the whole house. List additional fixtures that are not included in the groups.
[2] Add any continuous supply demands to the peak demand estimate.
[3] Use Table N 102.2.3 to determine the pipe diameter. At 8 ft/sec (2.4 m/s), the pipe diameter for 12 gpm (0.76 L/s) is ¾ inch (20 mm).

TABLE N 103.0(3)
SIZING FOR PIPE SECTION 2 – COLD WATER SUPPLY BRANCH[1]

FIXTURE TYPE	*n*	*p*	*q*	*npq*	*np(1-p)q^2*	*Po*	*nq*
	COUNT	PROBABILITY	FLOW RATE (gallons per minute)	MEAN FLOW (gallons per minute)	FLOW VARIANCE (gallons per minute)[2]	PROBABILITY OF NO FLOW	MAX POSSIBLE FLOW (gallons per minute)
Shower	0	0.025	2.0	0.0000	0.0000	1.0000	0.0
Tub/Shower Combo	0	0.030	4.5	0.0000	0.0000	1.0000	0.0
Tub Filler – Stand Alone Bathtub	0	0.005	7.0	0.0000	0.0000	1.0000	0.0
Water Closet, Gravity Tank	1	0.010	4.0	0.0400	0.1584	0.9900	4.0
Lavatory Faucet	1	0.025	1.5	0.0375	0.0548	0.9750	1.5
Kitchen Sink Faucet	1	0.025	2.2	0.0550	0.1180	0.9750	2.2
Dishwasher	0	0.005	1.6	0.0000	0.0000	1.0000	0.0
Clothes Washer	1	0.050	4.5	0.2250	0.9619	0.9500	4.5
Laundry Sink Faucet	0	0.025	2.0	0.0000	0.0000	1.0000	0.0
Bathroom Group	0	0.065	0.0	0.0000	0.0000	1.0000	0.0
Kitchen Group	0	0.030	0.0	0.0000	0.0000	1.0000	0.0
Total	**4**			**0.3575**	**1.2931**	**0.8941**	**12.2**
			Busy time	**3.3746**	**2.0245**		
z value	2.326						
Demand Q	**7**	**gpm**					

For SI units: 1 gallon per minute = 0.06 L/s
[1] In the second column (n), list the number of fixtures for the cold water supply for Pipe Section 2. The cold water supply at Pipe Section 2 serves (1) water closet, (1) lavatory faucet, (1) kitchen faucet, and (1) clothes washer.
[2] Use Table N 102.2.3 to determine the pipe diameter. At 8 ft/sec (2.4 m/s), the pipe diameter for 7 gpm (0.44 L/s) is ¾ inch (20 mm).

TABLE N 103.0(4)
SIZING FOR PIPE SECTION 28 – HOT WATER SUPPLY BRANCH[1]

FIXTURE TYPE	n COUNT	p PROBABILITY	q FLOW RATE (gallons per minute)	npq MEAN FLOW (gallons per minute)	np(1-p)q^2 FLOW VARIANCE (gallons per minute)²	Po PROBABILITY OF NO FLOW	nq MAX POSSIBLE FLOW (gallons per minute)
Shower	0	0.025	2.0	0.0000	0.0000	1.0000	0.0
Tub/Shower Combo	2	0.030	4.5	0.2700	1.1786	0.9409	0.0
Tub Filler – Stand Alone Bathtub	0	0.005	7.0	0.0000	0.0000	1.0000	0.0
Water Closet, Gravity Tank	0	0.010	4.0	0.0000	0.0000	1.0000	0.0
Lavatory Faucet	2	0.025	1.5	0.0750	0.1097	0.9506	3.0
Kitchen Sink Faucet	0	0.025	2.2	0.0000	0.0000	1.0000	0.0
Dishwasher	0	0.005	1.6	0.0000	0.0000	1.0000	0.0
Clothes Washer	0	0.050	4.5	0.0000	0.0000	1.0000	0.0
Laundry Sink Faucet	0	0.025	2.0	0.0000	0.0000	1.0000	0.0
Bathroom Group	0	0.065	0.0	0.0000	0.0000	1.0000	0.0
Kitchen Group	0	0.030	0.0	0.0000	0.0000	1.0000	0.0
Total	**4**			**0.3450**	**1.2882**	**0.8944**	**12.0**
			Busy time	**3.2684**	**2.6495**		
z value	2.326						
Demand Q	7	**gpm**					

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

[1] In the second column (n), list the number of fixtures for the hot water supply for Pipe Section 28. The hot water supply at Pipe Section 28 serves (2) combination tub and showers and (2) lavatory faucets.

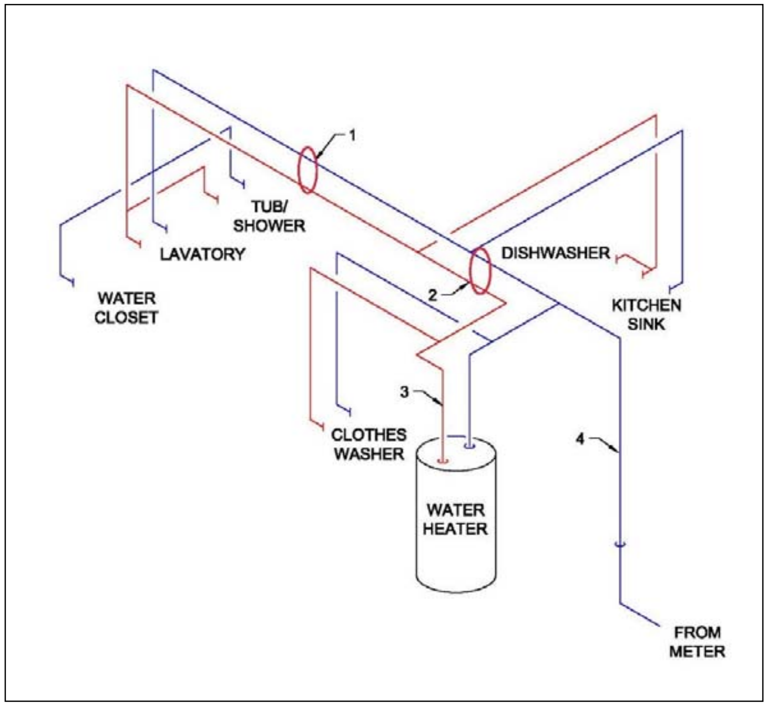
[2] Use Table N 102.2.3 to determine the pipe diameter. At 8 ft/sec (2.4 m/s), the pipe diameter for 7 gpm (0.44 L/s) is ¾ inch (20 mm).

N 102.8 Examples Illustrating Use of Water Demand Calculator with Appendix A.

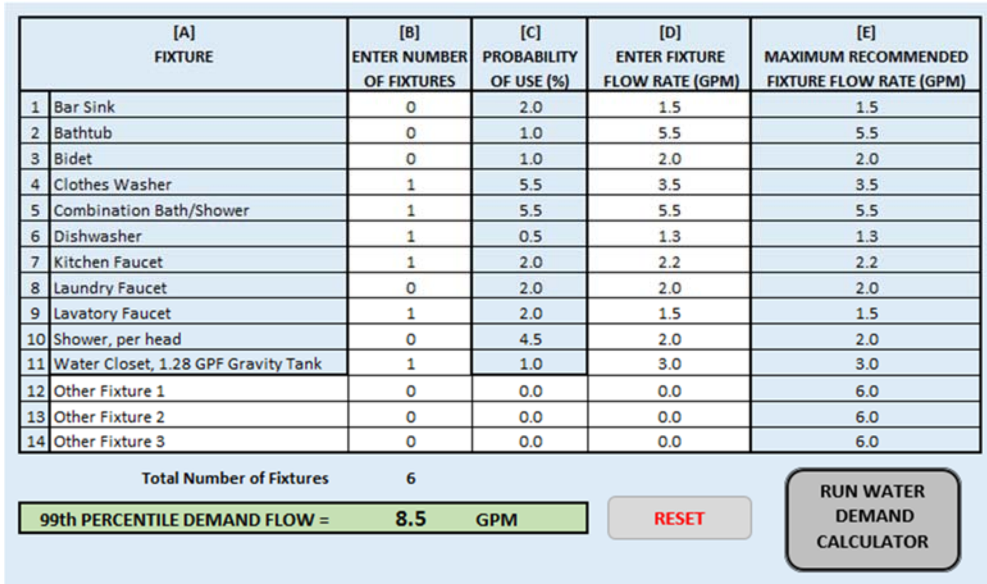
Example 1: Indoor Water Use Only - Use the information given below to find the pipe size for the building supply to a residential building with six indoor fixtures as shown in Figure 1 [Pipe Section 4].

Given Information:

Type of construction:	Residential, one-bathroom	Friction loss per 100 ft:	15 psi
Type of pipe material:	L-copper	Maximum velocity:	10 ft/s
Fixture number/type:	1 combination bath/shower	1 kitchen faucet	
	1 lavatory faucet	1 dishwasher	
	1 WC	1 clothes washer	

	 **Figure 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 is used to determine the demand load expected from indoor water use. The WDC has white-shaded cells and blue-shaded cells. The values in the blue cells are derived from a national survey[1] 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 Column [B]; the corresponding recommended fixture flow rates are already provided in Column [D]. The flow rates in Column [D] may be reduced only if the manufacturer specifies a lower flow rate for the fixture. Column [E] establishes the upper limits for the flow rates entered into Column [D]. Clicking the ***Run Water Demand Calculator*** button gives 8.5 gpm as the estimated indoor water demand for the whole building. This result appears in the green box of the WDC in Figure 2.

[1] Buchberger, S., Omaghomi, T., Wolfe, T., Hewitt, J., and Cole, D., Peak Water Demand Study. 2016.



	[A] FIXTURE	[B] ENTER NUMBER OF FIXTURES	[C] PROBABILITY OF USE (%)	[D] ENTER FIXTURE FLOW RATE (GPM)	[E] MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
1	Bar Sink	0	2.0	1.5	1.5
2	Bathtub	0	1.0	5.5	5.5
3	Bidet	0	1.0	2.0	2.0
4	Clothes Washer	1	5.5	3.5	3.5
5	Combination Bath/Shower	1	5.5	5.5	5.5
6	Dishwasher	1	0.5	1.3	1.3
7	Kitchen Faucet	1	2.0	2.2	2.2
8	Laundry Faucet	0	2.0	2.0	2.0
9	Lavatory Faucet	1	2.0	1.5	1.5
10	Shower, per head	0	4.5	2.0	2.0
11	Water Closet, 1.28 GPF Gravity Tank	1	1.0	3.0	3.0
12	Other Fixture 1	0	0.0	0.0	6.0
13	Other Fixture 2	0	0.0	0.0	6.0
14	Other Fixture 3	0	0.0	0.0	6.0

Total Number of Fixtures 6

99th PERCENTILE DEMAND FLOW = 8.5 GPM

RESET

RUN WATER DEMAND CALCULATOR

Figure 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) 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, the intersection of the given friction loss (15 psi) and the maximum allowable pipe velocity (10 ft/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, ¾ inch, ½ inch and 3/8 inch, respectively. A horizontal line from points **B, C, D, E** to the right-hand side of the chart gives maximum flow rates of 24 gpm, 12 gpm, 4.5 gpm, and 2.3 gpm, respectively. These results are summarized in Table 1 which shows that a ¾-inch L-copper line is the minimum size that can convey the peak water demand of 8.5 gpm.

Table 1
Pipe size options for building supply

Point in Figure 3	**Pipe Diameter (inch)**	**Maximum Flow (gpm)**	**OK for Building Supply?[1]**
E	3/8	2.3	No
D	1/2	4.5	No
C	3/4	12	Yes
B	1	24	Yes

[1]. For Building in Examples 1, 2, 3, and 4.

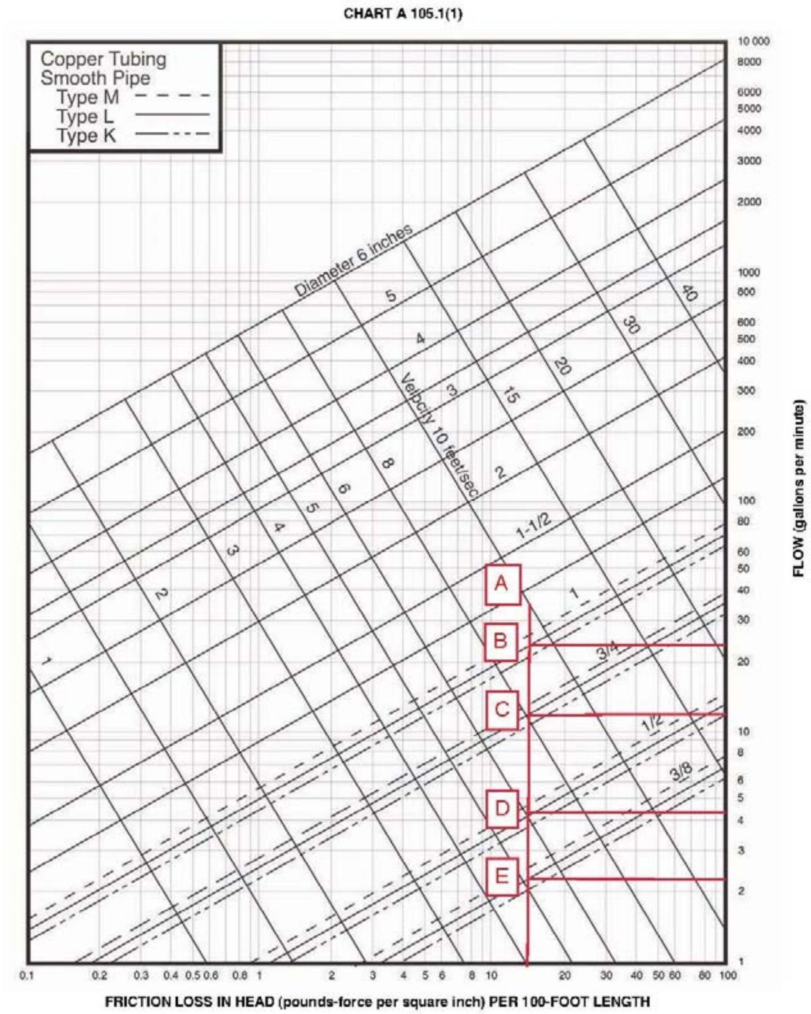


Figure 3. Chart A 105.1(1) for finding pipe size.

Example 2: Indoor and Outdoor Water Use – Find the pipe size for the building supply [Figure 1, Pipe Section 4] if the building in Example 1 adds two outdoor fixtures (silcocks, each with a fixture flow of 2.0 gpm).

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 silcocks, the demand of only one silcock is included. Hence, in this example, the total demand for the whole house is 8.5 gpm + 2.0 gpm = 10.5 gpm.

Solution: Step 2 of 2 – Determine the Pipe Size of the Building Supply

Table 1 shows that at 10.5 gpm the building supply shall be ¾-inch in diameter.

Example 3: Indoor, Outdoor and Other Fixture Water Use – Find the pipe size for the water supply [Figure 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.

Solution: Step 1 of 2 – Find Demand Load for the Building Supply

The kitchen pot filler and dog bath are not listed in 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 Column [A] of the WDC and enter the fixture count for each in Column [B]. Find an indoor fixture that has a similar probability of use in Column [C] and add that to the column. Finally, enter the flow rate of the kitchen pot filler and dog bath in Column [D]. The estimated indoor water demand for the whole building is 11 gpm, as shown in the WDC in Figure 4. As illustrated in Example 2, the silcock will increase the total demand for the whole house to 13 gpm.

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 1 shows that at 13 gpm the building supply shall be 1-inch in diameter.

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 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. Use the calculated demand load to find the pipe size in Step 2. Table 1 shows that at 7.7 gpm, the hot water branch shall be ¾-inch in diameter.

For each additional hot and cold branch [Figure 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 silcock, add the demand of the silcock to the calculated demand flow for the branch. As discussed in Example 2, the silcock 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 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.

	[A] FIXTURE	[B] ENTER NUMBER OF FIXTURES	[C] PROBABILITY OF USE (%)	[D] ENTER FIXTURE FLOW RATE (GPM)	[E] MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
1	Bar Sink	0	2.0	1.5	1.5
2	Bathtub	0	1.0	5.5	5.5
3	Bidet	0	1.0	2.0	2.0
4	Clothes Washer	1	5.5	3.5	3.5
5	Combination Bath/Shower	1	5.5	5.5	5.5
6	Dishwasher	1	0.5	1.3	1.3
7	Kitchen Faucet	1	2.0	2.2	2.2
8	Laundry Faucet	0	2.0	2.0	2.0
9	Lavatory Faucet	1	2.0	1.5	1.5
10	Shower, per head	0	4.5	2.0	2.0
11	Water Closet, 1.28 GPF Gravity Tank	1	1.0	3.0	3.0
12	Pot Filler	1	2.0	5.5	6.0
13	Dog Bath	1	1.0	5.5	6.0
14	Other Fixture 3	0	0.0	0.0	6.0
	Total Number of Fixtures	8			

99th PERCENTILE DEMAND FLOW = 11.0 GPM

RESET

RUN WATER DEMAND CALCULATOR

Figure 4. Water demand calculator to accommodate Other Fixtures (Example 3).

	[A] FIXTURE	[B] ENTER NUMBER OF FIXTURES	[C] PROBABILITY OF USE (%)	[D] ENTER FIXTURE FLOW RATE (GPM)	[E] MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
1	Bar Sink	0	2.0	1.5	1.5
2	Bathtub	0	1.0	5.5	5.5
3	Bidet	0	1.0	2.0	2.0
4	Clothes Washer	1	5.5	3.5	3.5
5	Combination Bath/Shower	1	5.5	5.5	5.5
6	Dishwasher	1	0.5	1.3	1.3
7	Kitchen Faucet	1	2.0	2.2	2.2
8	Laundry Faucet	0	2.0	2.0	2.0
9	Lavatory Faucet	1	2.0	1.5	1.5
10	Shower, per head	0	4.5	2.0	2.0
11	Water Closet, 1.28 GPF Gravity Tank	0	1.0	3.0	3.0
12	Other Fixture 1	0	0.0	0.0	6.0
13	Other Fixture 2	0	0.0	0.0	6.0
14	Other Fixture 3	0	0.0	0.0	6.0
	Total Number of Fixtures	5			

99th PERCENTILE DEMAND FLOW = 7.7 GPM

RESET

RUN WATER DEMAND CALCULATOR

Figure 5. Water demand calculator for the hot water branch (Example 4).

Problem Statement:

The amended proposal provides an updated Water Demand Calculator [WDC] to estimate the demand load for residential water supply systems with efficient plumbing fixtures and appliances. The intended use of the WDC is to provide an estimated water supply demand for the building main and the principal branches and risers for the proper sizing of a residential water supply system. Section N 102.7 refers to Appendix A in the UPC for the procedures to follow after determining the demand load by using the WDC. The Water Demand Calculator referenced in this proposal would be used in lieu of UPC Section A 103.0, Table A 103.1, and Charts A 103.1(1) and A 103.1 (2) to determine the demand load for single- and multi-family dwellings with water-conserving plumbing fixtures, fixture fittings, and appliances. New pipe sizing examples are provided to better illustrate how the WDC is used with Appendix A.

Equation N 102.2.1 (1) is no longer necessary to publish in the provisions of the Code since it is incorporated into the Water Demand Calculator and would not have use apart from the Calculator. The equation(s) and the rationale for the Water Demand Calculator are provided in the peer-reviewed Peak Water Demand Study and attached to this substantiation as a supporting document as well as the IAPMO Water Demand Calculator.

The peer review affirmed the soundness of the statistical method employed. The input parameters for the equation are the number of fixtures (n), fixture flow rates (q), and the probability of fixture use (p). These parameters were derived from a large U.S. database for residential end use of water (Aquacraft, Inc.). A database comprising of over 1000 homes was specially developed for the purpose of estimating probabilities and flow rates for various levels of fixture water efficiencies. The fixture flow rates in Table N 102.1 represent typical demands for efficient fixtures during peak hours.

Similar to the criterion used by Dr. Hunter, the estimated peak demand provided by the Water Demand Calculator is the 99th percentile (Q99) of all water demands expected at the residence during the design hour. The 99th percentile means there is only a one percent chance that the actual demand will exceed the design demand during the peak hour of water use in the residence. Exceeding the design demand in residential dwellings does not impose severity upon the plumbing system. The efficient fixtures are purposely designed for flows with low intensity and short duration. Exceeding the demand may slightly lengthen the flow duration or slightly reduce the flow rate at the fixture. These effects would probably be imperceptible to the user.

The proof of the adequacy of the proposed method of estimating the demand loads to be expected in residential water-supply systems will, in the end, depend on its success in actual trial over a period of years. Dr. Hunter made a similar observation when he published his design curve in 1940. The Hunter method has proven successful even though its parameters are based on a relatively sparse sample of water users residing at one hotel. The proposed method is based on a much larger data set, comprised of 863,000 water use events during 11,385 home-days of monitoring at over 1,000 homes.

The IAPMO Water Demand Calculator will be provided for the user as a downloadable Microsoft Office Excel file as seen in Table N 102.3. The values in Table N 102.1 are provided in the spreadsheet, and the only variable the user needs to provide is the number of plumbing fixtures in Column [B].

Please NOTE: The Water Demand Calculator is a Microsoft Office Excel file and requires a compatible version of Excel 2009 or later to prevent loss of functionality. This file also uses active content (macros). When downloading this file, Microsoft Office has security features causing a message bar to appear warning that the active content may contain viruses and other security hazards that could harm your computer or your organization's network and that the macros have been disabled. This does not mean that viruses have been detected. It only means that active content has been detected and the user is being warned. Since the source file comes from IAPMO, the file can be *trusted* and the macros can be enabled. You may need to change the settings in the Trust Center on your computer (find this in the Options section of Microsoft Office applications). Once the file is trusted, the warning will no longer appear.
A clean copy of the amended changes is provided below for easier reading.

Appendix N

(This appendix is based on the technical paper entitled, "Peak Water Demand Study." A copy of the paper is available for download at http://www.iapmo.org/WESTAND/Pages/DocumentInformation.aspx)

N 101.0 General.

N 101.1 Applicability. This appendix provides a method for estimating the demand load for the building water supply and principal branches for single- and multi-family dwellings with water-conserving plumbing fixtures, fixture fittings, and appliances.

N 102.0 Demand Load.

N 102.1 Water-Conserving Fixtures. Plumbing fixtures, fixture fittings, and appliances shall not exceed the design flow rate in Table N 102.1.

N 102.2 Water Demand Calculator. The estimated 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 http://www.iapmo.org/WESTAND/Pages/DocumentInformation.aspx.

N 102.3 Meter and Building Supply. To determine the design flow rate for the water meter and building supply, enter the total number of indoor plumbing fixtures and appliances for the building in Column [B] of the Water Demand Calculator and run Calculator. See Table N 102.3 for an example.

N 102.4 Fixture Branches and Fixture Supplies. To determine the design flow rate for fixture branches and risers, enter the total number of plumbing fixtures and appliances for the fixture branch or riser in Column [B] of the Water Demand Calculator and run Calculator. The flow rate for one fixture branch and one fixture supply shall be the design flow rate of the fixture according to Table N 102.1.

N 102.5 Continuous Supply Demand. Continuous supply demands in gallons per minute (gpm) for lawn sprinklers, air conditioners, silcocks, etc., shall be added to the total estimated demand for the building supply as determined by Section N 102.3. Where there is more than one silcock installed on the plumbing system, the demand for only one silcock shall be added to the total estimated demand for the building supply. Where a silcock is installed on a fixture branch, the demand of the silcock shall be added to the design flow rate for the fixture branch as determined by Section N 102.4.

N 102.6 Other Fixtures. Fixtures not included in Table N 102.1 shall be added in Rows 12 through 14 in the Water Demand Calculator as Other Fixture. The probability of use and flow rate for Other Fixtures shall be added by selecting a comparable probability of use and flow rate from Columns [C] and [E].

N 102.7 Size of Water Piping per Appendix A. Except as provided in Section N 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. After determining the permissible friction loss per 100 feet of pipe in accordance with Section A 104.0 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), or Chart A 105.1(4), whichever is applicable, in accordance with Section A 105.0 and Section A 106.0. Velocities shall be in accordance with Section A 107.0. Appendix I, Figure 3 and Figure 4 shall be permitted when sizing PEX systems.

TABLE N 102.1
DESIGN FLOW RATE FOR WATER-CONSERVING PLUMBING FIXTURES AND APPLIANCES IN RESIDENTIAL OCCUPANCIES

FIXTURE AND APPLIANCE	MAXIMUM DESIGN FLOW RATE (gallons per minute)
Bar Sink	1.5
Bathtub	5.5
Bidet	2.0
Clothes Washer[1]	3.5
Combination Bath/Shower	5.5
Dishwasher[1]	1.3
Kitchen Faucet	2.2
Laundry Faucet (with aerator)	2.0
Lavatory Faucet	1.5
Shower, per head	2.0
Water Closet, 1.28 GPF Gravity Tank	3.0

For SI units: 1 gallon per minute = 0.06 L/s
[1] Clothes washers and dishwashers shall have an energy star label.

Table N 102.3
Water Demand Calculator Example

	[A] FIXTURE	[B] ENTER NUMBER OF FIXTURES	[C] PROBABILITY OF USE (%)	[D] ENTER FIXTURE FLOW RATE (GPM)	[E] MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
1	Bar Sink	0	2.0	1.5	1.5
2	Bathtub	0	1.0	5.5	5.5
3	Bidet	0	1.0	2.0	2.0
4	Clothes Washer	1	5.5	3.5	3.5
5	Combination Bath/Shower	1	5.5	5.5	5.5
6	Dishwasher	1	0.5	1.3	1.3
7	Kitchen Faucet	1	2.0	2.2	2.2
8	Laundry Faucet	0	2.0	2.0	2.0
9	Lavatory Faucet	1	2.0	1.5	1.5
10	Shower, per head	0	4.5	2.0	2.0
11	Water Closet, 1.28 GPF Gravity Tank	1	1.0	3.0	3.0
12	Other Fixture 1	0	0.0	0.0	6.0
13	Other Fixture 2	0	0.0	0.0	6.0
14	Other Fixture 3	0	0.0	0.0	6.0

Total Number of Fixtures 6

99th PERCENTILE DEMAND FLOW = 8.5 GPM

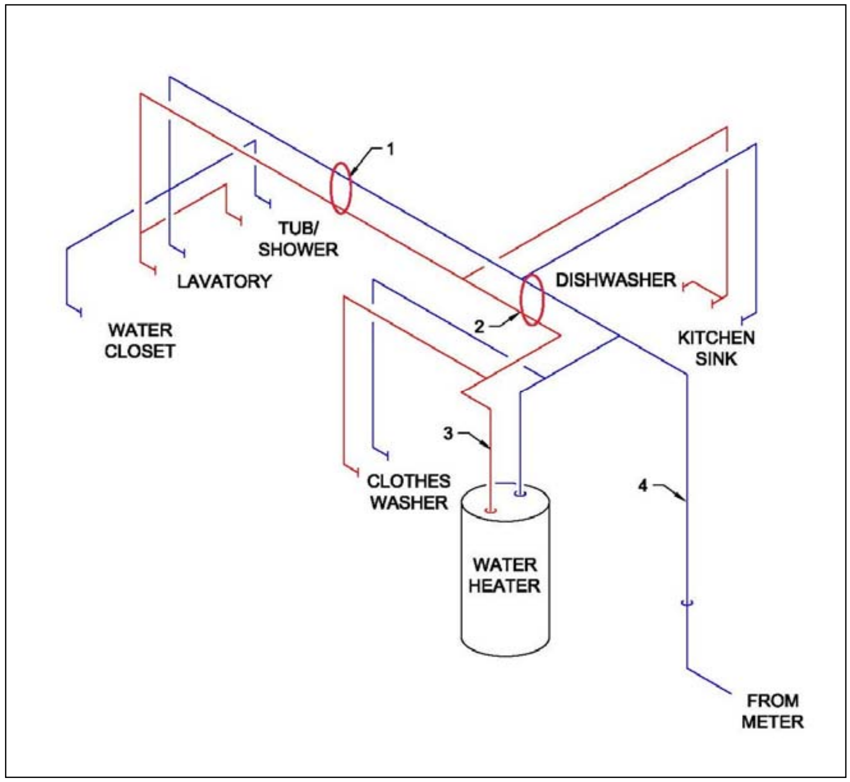
RESET

RUN WATER DEMAND CALCULATOR

N 102.8 Examples Illustrating Use of Water Demand Calculator with Appendix A.
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 [Pipe Section 4].

Given Information:

Type of construction:	Residential, one-bathroom	Friction loss per 100 ft:	15 psi
Type of pipe material:	L-copper	Maximum velocity:	10 ft/s
Fixture number/type:	1 combination bath/shower	1 kitchen faucet	
	1 lavatory faucet	1 dishwasher	

	1 WC 1 clothes washer  **Figure 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 is used to determine the demand load expected from indoor water use. The WDC has white-shaded cells and blue-shaded cells. The values in the blue cells are derived from a national survey[2] 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 Column [B]; the corresponding recommended fixture flow rates are already provided in Column [D]. The flow rates in Column [D] may be reduced only if the manufacturer specifies a lower flow rate for the fixture. Column [E] establishes the upper limits for the flow rates entered into Column [D]. Clicking the ***Run Water Demand Calculator*** button gives 8.5 gpm as the estimated indoor water demand for the whole building. This result appears in the green box of the WDC in Figure 2.

[2] Buchberger, S., Omaghomi, T., Wolfe, T., Hewitt, J., and Cole, D., Peak Water Demand Study. 2016.

[A] FIXTURE		[B] ENTER NUMBER OF FIXTURES	[C] PROBABILITY OF USE (%)	[D] ENTER FIXTURE FLOW RATE (GPM)	[E] MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
1	Bar Sink	0	2.0	1.5	1.5
2	Bathtub	0	1.0	5.5	5.5
3	Bidet	0	1.0	2.0	2.0
4	Clothes Washer	1	5.5	3.5	3.5
5	Combination Bath/Shower	1	5.5	5.5	5.5
6	Dishwasher	1	0.5	1.3	1.3
7	Kitchen Faucet	1	2.0	2.2	2.2
8	Laundry Faucet	0	2.0	2.0	2.0
9	Lavatory Faucet	1	2.0	1.5	1.5
10	Shower, per head	0	4.5	2.0	2.0
11	Water Closet, 1.28 GPF Gravity Tank	1	1.0	3.0	3.0
12	Other Fixture 1	0	0.0	0.0	6.0
13	Other Fixture 2	0	0.0	0.0	6.0
14	Other Fixture 3	0	0.0	0.0	6.0

Total Number of Fixtures 6

99th PERCENTILE DEMAND FLOW = 8.5 GPM

RESET

RUN WATER DEMAND CALCULATOR

Figure 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) 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, the intersection of the given friction loss (15 psi) and the maximum allowable pipe velocity (10 ft/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, ¾ inch, ½ inch and 3/8 inch, respectively. A horizontal line from points **B, C, D, E** to the right-hand side of the chart gives maximum flow rates of 24 gpm, 12 gpm, 4.5 gpm, and 2.3 gpm, respectively. These results are summarized in Table 1 which shows that a ¾-inch L-copper line is the minimum size that can convey the peak water demand of 8.5 gpm.

Table 1
Pipe size options for building supply

Point in Figure 3	Pipe Diameter (inch)	Maximum Flow (gpm)	OK for Building Supply?[1]
E	3/8	2.3	No
D	1/2	4.5	No
C	3/4	12	Yes
B	1	24	Yes

1. For Building in Examples 1, 2, 3, and 4.

CHART A 105.1(1)

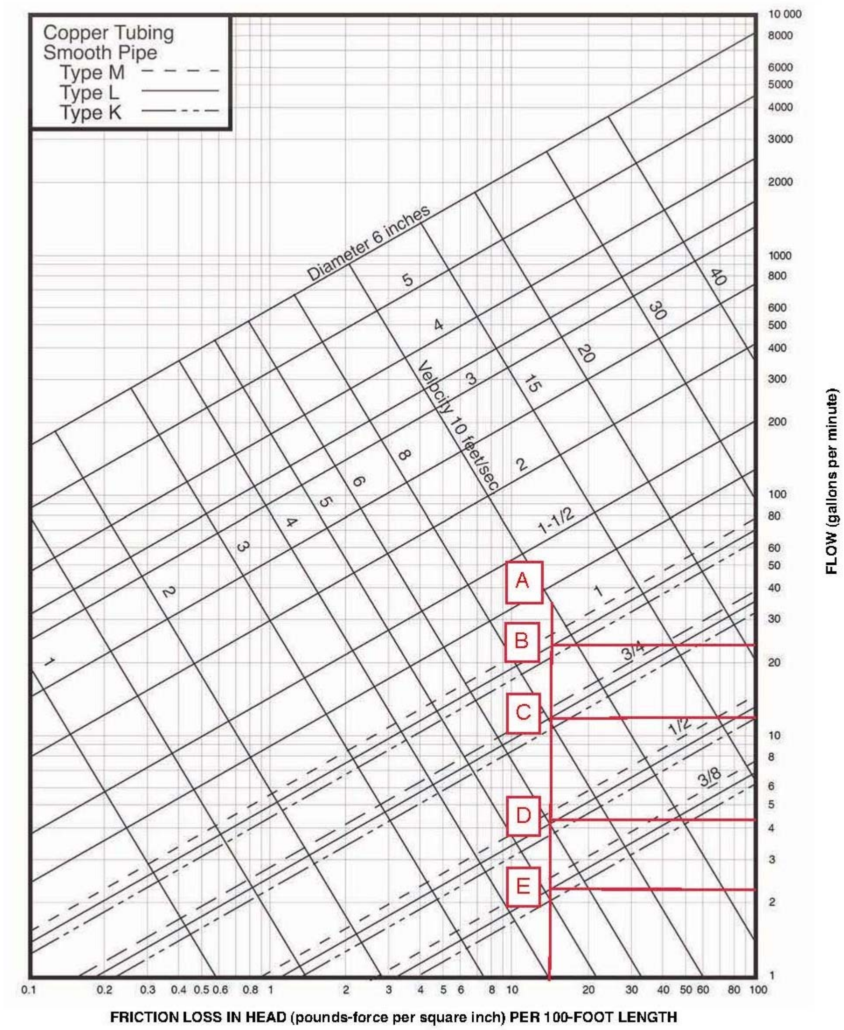


Figure 3. Chart A 105.1(1) for finding pipe size.

__Example 2:__ **Indoor and Outdoor Water Use –** Find the pipe size for the building supply [Figure 1, Pipe Section 4] if the building in Example 1 adds two outdoor fixtures (silcocks, each with a fixture flow of 2.0 gpm).

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 silcocks, the demand of only one silcock is included. Hence, in this example, the total demand for the whole house is 8.5 gpm + 2.0 gpm = 10.5 gpm.

Solution: Step 2 of 2 – Determine the Pipe Size of the Building Supply

Table 1 shows that at 10.5 gpm the building supply shall be ¾-inch in diameter.

__Example 3:__ **Indoor, Outdoor and Other Fixture Water Use –** Find the pipe size for the water supply [Figure 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.

Solution: Step 1 of 2 – Find Demand Load for the Building Supply

The kitchen pot filler and dog bath are not listed in 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 Column [A] of the WDC and enter the fixture count for each in Column [B]. Find an indoor fixture that has a similar probability of use in Column [C] and add that to the column. Finally, enter the flow rate of the kitchen pot filler and dog bath in Column [D]. The estimated indoor water demand for the whole building is 11 gpm, as shown in the WDC in Figure 4. As illustrated in Example 2, the silcock will increase the total demand for the whole house to 13 gpm.

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 1 shows that at 13 gpm the building supply shall be 1-inch in diameter.

<u>Example 4:</u> 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 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. Use the calculated demand load to find the pipe size in Step 2. Table 1 shows that at 7.7 gpm, the hot water branch shall be ¾-inch in diameter.

For each additional hot and cold branch [Figure 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 silcock, add the demand of the silcock to the calculated demand flow for the branch. As discussed in Example 2, the silcock 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 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.

	[A] FIXTURE	[B] ENTER NUMBER OF FIXTURES	[C] PROBABILITY OF USE (%)	[D] ENTER FIXTURE FLOW RATE (GPM)	[E] MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
1	Bar Sink	0	2.0	1.5	1.5
2	Bathtub	0	1.0	5.5	5.5
3	Bidet	0	1.0	2.0	2.0
4	Clothes Washer	1	5.5	3.5	3.5
5	Combination Bath/Shower	1	5.5	5.5	5.5
6	Dishwasher	1	0.5	1.3	1.3
7	Kitchen Faucet	1	2.0	2.2	2.2
8	Laundry Faucet	0	2.0	2.0	2.0
9	Lavatory Faucet	1	2.0	1.5	1.5
10	Shower, per head	0	4.5	2.0	2.0
11	Water Closet, 1.28 GPF Gravity Tank	1	1.0	3.0	3.0
12	Pot Filler	1	2.0	5.5	6.0
13	Dog Bath	1	1.0	5.5	6.0
14	Other Fixture 3	0	0.0	0.0	6.0

Total Number of Fixtures 8

99th PERCENTILE DEMAND FLOW = 11.0 GPM

RESET

RUN WATER DEMAND CALCULATOR

Figure 4. Water demand calculator to accommodate Other Fixtures (Example 3).

[A] FIXTURE		[B] ENTER NUMBER OF FIXTURES	[C] PROBABILITY OF USE (%)	[D] ENTER FIXTURE FLOW RATE (GPM)	[E] MAXIMUM RECOMMENDED FIXTURE FLOW RATE (GPM)
1	Bar Sink	0	2.0	1.5	1.5
2	Bathtub	0	1.0	5.5	5.5
3	Bidet	0	1.0	2.0	2.0
4	Clothes Washer	1	5.5	3.5	3.5
5	Combination Bath/Shower	1	5.5	5.5	5.5
6	Dishwasher	1	0.5	1.3	1.3
7	Kitchen Faucet	1	2.0	2.2	2.2
8	Laundry Faucet	0	2.0	2.0	2.0
9	Lavatory Faucet	1	2.0	1.5	1.5
10	Shower, per head	0	4.5	2.0	2.0
11	Water Closet, 1.28 GPF Gravity Tank	0	1.0	3.0	3.0
12	Other Fixture 1	0	0.0	0.0	6.0
13	Other Fixture 2	0	0.0	0.0	6.0
14	Other Fixture 3	0	0.0	0.0	6.0
	Total Number of Fixtures	5			

99th PERCENTILE DEMAND FLOW = 7.7 GPM

RESET

RUN WATER DEMAND CALCULATOR

Figure 5. Water demand calculator for the hot water branch (Example 4).

Referenced Standards:	

A PUBLIC COMMENT(S) WAS SUBMITTED FOR REIVEW AND CONSIDERATION.
PUBLIC COMMENT 2:

WE-Stand 2017 – (Appendix X) Item # TC Proposal 9

Name:	Michael Cudahy
Organization:	Plastic Pipe and Fittings Association
Recommendation:	Request to accept the code change proposal as modified by this public comment.
Section Number:	Appendix X
Proposed Text:	**Delete existing Table X 1022.3, Add new tables, X 1022.3.1, X 1022.3.2, X 1022.3.3**

-

Table X 102.2.3.1
Maximum Flow Rate (gpm) for Pipe Diameters
(Smooth pipe - L-copper)

-

Maximum Flow Rate 4ft/s						
3/8	1/2	3/4	1	1 1/4	1 1/2	2
2	3	6	11	16	23	39
Maximum Flow Rate at 5ft/sec						
3/8	1/2	3/4	1	1 1/4	1 1/2	2
2	4	8	13	20	28	48

Maximum Flow Rate at 8ft/sec						
3/8	1/2	3/4	1	1 1/4	1 1/2	2
4	6	12	21	31	44	77

-

Table X 102.2.3.2
Maximum Flow Rate (gpm) for Pipe Diameters
(Smooth pipe - PEX or PERT)

-

Maximum Flow Rate 5ft/s						
3/8	1/2	3/4	1	1 1/4	1 1/2	2
2	3	6	9	13	20	34
Maximum Flow Rate at 8ft/sec						
3/8	1/2	3/4	1	1 1/4	1 1/2	2
2	4	9	14	22	31	54
Maximum Flow Rate at 10ft/sec						
3/8	1/2	3/4	1	1 1/4	1 1/2	2
3	6	11	18	28	39	67

-
-

Table X 102.2.3.3
Maximum Flow Rate (gpm) for Pipe Diameters
(Smooth pipe - SDR 11 CPVC)

-

Maximum Flow Rate 5ft/s						
3/8	1/2	3/4	1	1 1/4	1 1/2	2
2	3	6	10	15	21	35
Maximum Flow Rate at 8ft/sec						
3/8	1/2	3/4	1	1 1/4	1 1/2	2
2	5	9	16	24	35	60
Maximum Flow Rate at 10ft/sec						
3/8	1/2	3/4	1	1 1/4	1 1/2	2
3	6	12	20	30	42	70

-

Problem Statement:	Table X 102.2.3 (copper) appears to have flow velocities that seem too high for the material. CDA recommends 5-8 ft/sec with cold water. Section X 102.2.3 mentions manufacture's specifications as an option, but copper should not be used at 10 ft/sec. We are offering 4, 5 and 8 ft/sec for copper and additional tables for CPVC, PEX and PERT. From the CDA's Design and Installation Data: Pressure System Sizing, "To avoid excessive system noise and the possibility of erosion-corrosion, the designer should not exceed flow velocities of 8 feet per second for cold water and 5 feet per second in hot water up to approximately 140°F. In systems where water temperatures routinely exceed 140°F, lower flow velocities such as 2 to 3 feet per second should not be exceeded. In addition, where 1/2-inch and smaller tube sizes

	are used, to guard against localized high velocity turbulence due to possibly faulty workmanship (e.g. burrs at tube ends which were not properly reamed/deburred) or unusually numerous, abrupt changes in flow direction, lower velocities should be considered. Locally aggressive water conditions can combine with these two considerations to cause erosion-corrosion if system velocities are too high."
Referenced Standards:	

Staff Note: This would become Appendix C