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AGENDA

I. Call to Order
II. Chairman Comments
III. Announcements
IV. Self-Introductions
V. Review and Approval of Agenda
VI. Approval of Minutes from Previous Meeting (Virtual Webinar on May 3-7, 2021)
VII. Report of UPC Condensate Task Group (Chair)
VIII. Report of UPC Indoor Horticulture Facilities Task Group (Chair)
IX. Discussion of Public Comments to the Uniform Plumbing Code
X. Other business
XI. Next scheduled meeting
XII. Adjournment
TENTATIVE ORDER OF DISCUSSION
2022 PROPOSED PUBLIC COMMENTS TO THE UNIFORM PLUMBING CODE

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

Item # 005  Item # 007  Item # 009  Item # 010  Item # 028  Item # 030  Item # 031  Item # 036  Item # 037  Item # 041  Item # 042  Item # 044  Item # 049  Item # 050  Item # 051
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Item # 332  Item # 333  Item # 334  Item # 335  Item # 336  Item # 337  Item # 339  Item # 340  Item # 341  Item # 342  Item # 343  Item # 348  Item # 249  Item # 252  Item # 255  Item # 256  Item # 264  Item # 265  Item # 266  Item # 270  Item # 271  Item # 278  Item # 282
Item # 304  Item # 305  Item # 307  Item # 324  Item # 325  Item # 327  Item # 329  Item # 330
Uniform Plumbing Code Public Comments
Proposals

Item #: 005
UPC 2024 Section: 203.0

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Revise text

203.0 - A -

Appliance. A device that utilizes fuel or electricity as an energy source to produce light, heat, power, refrigeration, or air conditioning, or compressed fuel gas. This definition also shall include a vented decorative appliances and electric storage or tankless water heaters.

SUBSTANTIATION:
The change removes enforceable language that is not permitted in a definition per the Manual of Style. The update also removes “compressed fuel gas” as it is used out of context and is now addressed under “fuel.” Furthermore, the additional language to the “Appliance” definition reintroduces electric water heater into the plumbing code.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 18 NEGATIVE: 7 NOT RETURNED: 1 Daniels

EXPLANATION OF NEGATIVE:
BALLANCO: Adding the “fuel or electricity” eliminates appliances that have alternative energy sources such as solar, wind, or water.

BARBATO: “Fuel or electrical” is too restrictive. Energy can also come from other sources such as sun, wind, geothermal, tides, etc.

BROWN, FEEHAN: Fuel or electricity is not necessary and may be limiting.

CUDAHY: Fuel or electricity might be limiting.

GORSUCH: "Fuel or electricity as" is too restrictive, the original text "an energy source" is better. We should not start a list.

WHITE: The addition of "fuel or electricity" is not necessary, the original language, "an energy source" encompasses those forms of energy. Additionally, the addition of electric water heaters is the start of list-making, which can be confusing. Why not add gas water heaters too? List-making should be avoided.

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 203.0 Item #: 005

SUBMITTER: Karan Kapila Comment #: 1
Self

RECOMMENDATION:
Revise text

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

203.0 – A –
Appliance. A device that utilizes fuel or electricity as an energy source to produce light, heat, power, refrigeration, or air conditioning. This definition also includes vented decorative appliances and electric storage or tankless water heaters.

SUBSTANTIATION:
I agree with the Technical Committee concern with the phrase “fuel or electricity” is limiting. The modification removes such reference and leaves “an energy source” that will encompass all other sources such as wind, sun, geothermal, tides, etc.
203.0  – A –
Appliance Categorized Vent Diameter/Area. The minimum vent diameter/area permissible for Category I appliances to maintain a nonpositive vent static pressure when tested in accordance with nationally recognized standards. [NFPA 54:3.3.6-3.3.5]

204.0  – B –
Bonding Conductor or Jumper. A reliable conductor to ensure the required electrical conductivity between metal parts required to be electrically connected. [NFPA 70:100 (Part I)]

205.0  – C –
Chimney. One or more passageways, vertical or nearly so, for conveying flue or vent gases to the outdoors. [NFPA 54:3.3.18] Chimney, Factory-Built. A chimney composed of listed factory-built components assembled in accordance with the manufacturer’s installation instructions to form the completed chimney. [NFPA 54:3.3.18.2 3.3.17.2]
Chimney, Masonry. A field-constructed chimney of solid masonry units, bricks, stones, listed masonry chimney units, or reinforced Portland cement concrete, lined with suitable chimney flue liners. [NFPA 54:3.3.18.3 3.3.17.3]
Chimney, Metal. A chimney field-constructed chimney of metal with a minimum thickness not less than 0.127 inches (3.23 mm) (No. 10 manufacturer’s standard gauge) steel sheet. [NFPA 54:3.3.18.4]

206.0  – D –
Direct-Vent Appliances. Appliances that are constructed and installed so that all air for combustion is derived directly from the outdoors and all flue gases are discharged to the outdoors. [NFPA 54:3.3.5.3 3.3.4.2]

207.0  – E –
Effective Ground-Fault Current Path. An intentionally constructed, low impedance electrically conductive path designed and intended to carry current under ground-fault conditions from the point of a ground fault on a wiring system to the electrical supply source and that facilitates the operation of the overcurrent protective device or ground-fault detectors. [NFPA 70:10054:3.3.34]
Excess Flow Valve (EFV). A valve designed to activate when the fuel gas passing through it exceeds a prescribed flow rate. [NFPA 54:3.3.99.3 3.3.98.3]

219.0  – Q –
Quick-Disconnect Device, (Fuel Gas). A hand-operated device that provides a means for connecting and disconnecting an appliance or an appliance connector to a gas supply; and that is equipped with an automatic means to shut off the gas supply when the device is disconnected. [NFPA 54:3.3.28.3 3.3.27.3]
224.0 – V –

Vent Offset. An arrangement of two or more fittings and pipe installed for the purpose of locating a vertical section of vent pipe in a different but parallel plane with respect to an adjacent section of vertical vent pipe. [NFPA 54: 3.3.102 3.3.101]

SUBSTANTIATION:
The above sections have been revised to correlate with NFPA 54-2021 (latest version) in accordance with IAPMO’s Regulations Governing Committee Projects (Extract Guidelines).

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 224.0 Item #: 007

SUBMITTER: Adam Segura Self

Comment #: 1

RECOMMENDATION:

Revise text

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

224.0 – V –

Vented Appliance.

Category I Vented Appliance. An appliance that operates with a nonpositive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent. [NFPA 54: 3.3.4.10.1]

Category II Vented Appliance. An appliance that operates with a nonpositive vent static pressure and with a vent gas temperature that can cause excessive condensate production in the vent. [NFPA 54: 3.3.4.10.2]

Category III Vented Appliance. An appliance that operates with a positive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent. [NFPA 54: 3.3.4.10.3]

Category IV Vented Appliance. An appliance that operates with a positive vent static pressure and with a vent gas temperature that can cause excessive condensate production in the vent. [NFPA 54: 3.3.4.10.4]

SUBSTANTIATION:
The following definitions are used throughout the code and should be added to the UPC. These are common terms, and these definitions are very useful when categorizing appliances. These are extracts from the 2021 edition of NFPA 54 which will correlate with the definitions located in the UMC.
Proposals

Item #: 010  
UPC 2024  Section: 206.0

SUBMITTER: Arnie Rodio  
Self

RECOMMENDATION:  
Revise text

206.0 – D –

Dry Vent. A vent serving a horizontal wet vent system that does not receive the discharge of any sewage or waste.

SUBSTANTIATION:  
This helps clarify the location and proper use of a dry vent.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:  
The proposed language is unnecessary and does not further enhance the provided terminology.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appendixed Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 206.0  
Item #: 010  
Comment #: 1

SUBMITTER: Douglas Kirk  
Self

RECOMMENDATION:  
Revise text

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

206.0 – D –

Dry Vent. A vent that does not receive the discharge of any sewage or waste. Most commonly referred to for specific sections of pipe in horizontal wet venting of bathroom groups.

(below shown for reference only)

224.0 – V –

Vent. See Plumbing Vent; Dry Vent; Wet Vent.

908.2.1 Vent Connection. The dry vent connection to the wet vent shall be an individual vent for the bidet, shower, or bathtub. One or two vented lavatory(s) shall be permitted to serve as a wet vent for a bathroom group. Only one wet-vented fixture drain or trap arm shall discharge upstream of the dry-vented fixture drain connection. Dry vent connections to the horizontal wet vent shall be in accordance with Section 905.2 and Section 905.3.
**908.2.2 Size.** The wet vent shall be sized based on the fixture unit discharge into the wet vent. The wet vent shall be not less than 2 inches (50 mm) in diameter for 4 drainage fixture units (dfu) or less, and not less than 3 inches (80 mm) in diameter for 5 dfu or more. The dry vent shall be sized in accordance with Table 702.1 and Table 703.2 based on the total fixture units discharging into the wet vent.

**C 601.6 Additional Venting Required.** Additional venting shall be provided where more than one water closet is on a horizontal branch and where the distance from a fixture trap to the stack exceeds the limits in Section C 601.4. Where additional venting is required, the fixture(s) shall be vented by individual vents, common vents, wet vents, circuit vents, or a combination waste and vent pipe. The dry vent extensions for the additional venting shall connect to a branch vent, vent stack, stack vent, or be extended outdoors and terminate to the open air.

**SUBSTANTIATION:**
While this term may also be used when referencing other vents that only convey air, except for in two definitions and once in Appendix C, the term is exclusively used in Section 908.2.1 and Section 908.2.2.
Proposals

Item #: 028
UPC 2024  Section: 225.0

SUBMITTER:  Bob Adler
Self

RECOMMENDATION:
Add new text

225.0 – W –

**Water Station. A designated location intended to provide access to drinking water through a device or appliance.**

SUBSTANTIATION:
The term “water station” is used in the code and not currently defined. This definition will assist the end user to the intent of the term and how it will apply to the section and note of the UPC.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 21  NEGATIVE: 4  NOT RETURNED: 1  Daniels

EXPLANATION OF AFFIRMATIVE:

BALLANCO: I found two locations where the term "water station" is used. Hence, it appears appropriate to include this definition.

EXPLANATION OF NEGATIVE:

BROWN, SIGLER: There are already definitions for “bottle filling station” and “drinking fountain” in the code, and the proposed definition for “water station” could lead to confusion. If it is determined that a definition for “water station” is necessary, it should be based on its application in Section 415.2 which is specific to where food is consumed indoors.

CUDAHY, GORSUCH: Agree with Matt Sigler’s statement.

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Appended Comments

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PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 225.0  Item #: 028

SUBMITTER:  Douglas Kirk
Self

RECOMMENDATION:
Revise text

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

**Water Station.** A designated location, intended to provide access to drinking water through a device or appliance where food is served indoors, used to fill water glasses. A water station uses a tall self-closing water filler, a control lever, and a small stainless steel receptor with drain.

**SUBSTANTIATION:**
This comment provides a more complete definition of a water station.

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PUBLIC COMMENT 2

**Code Year:** 2024 UPC  **Section #:** 225.0  **Item #:** 028

**SUBMITTER:** Kyle Thompson  
Plumbing Manufacturers International (PMI)

**RECOMMENDATION:**
Revise text

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

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PUBLIC COMMENT 3

**Code Year:** 2024 UPC  **Section #:** 225.0  **Item #:** 028

**SUBMITTER:** Douglas Kirk  
Self

**RECOMMENDATION:**
Revise text

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

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**225.0 – W –**

**Water Station.** A designated location, where food is consumed indoors, intended to provide access to drinking water through a device or appliance.

(below shown for reference only)

**415.2 Drinking Fountain Alternatives.** Where food is consumed indoors, water stations shall be permitted to be substituted for drinking fountains. Bottle filling stations shall be permitted to be substituted for drinking fountains up to 50 percent of the requirements for drinking fountains. Drinking fountains shall not be required for an occupant load of 30 or less.

**SUBSTANTIATION:**
The term "water station" is only used once in the code in Section 415.2 where there is a specific allowance for substituting water stations for drinking fountains in places where food is consumed indoors. The proposed modification is intended to clarify the term "water station" and avoid confusion with terms that are in use for products that also provide access to drinking water such as "bottle filling stations" and "drinking fountains."

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**SUBSTANTIATION:**
This comment provides a more complete description of a water station. See the following image.
Proposals

Item #: 030
UPC 2024  Section: 301.3

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

301.0 General.

301.3 Alternate Materials and Methods of Construction Equivalency. Unless specifically prohibited, nothing in this code is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this code. Technical documentation shall be submitted to the Authority Having Jurisdiction to demonstrate equivalency prior to installation. The Authority Having Jurisdiction shall have the authority to approve or disapprove the system, method, or device for the intended purpose. However, the exercise of this discretionary approval by the Authority Having Jurisdiction shall have no effect beyond the jurisdictional boundaries of said Authority Having Jurisdiction. An alternate material or method of construction so approved shall not be considered as in accordance with the requirements, intent, or both of this code for a purpose other than that granted by the Authority Having Jurisdiction where the submitted data does not prove equivalency.

SUBSTANTIATION:
Section 301.3 grants authority to AHJ's to approve materials or products at their discretion. However, Section 301.3 places an obligation on the AHJ to approve only those alternate materials or products which comply "with the intent of this code," which are "at least the equivalent of that prescribed in this code," and are not specifically prohibited elsewhere in the code.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 19  NEGATIVE: 6  NOT RETURNED: 1  Daniels

EXPLANATION OF NEGATIVE:

BALLANCO: This change violates Federal Trade Laws. The provisions in this section date back more than 50 years when it was deemed that codes cannot restrain the use of new and innovative products or methods. In 1963, the Seventh Circuit Court of Appeals stated: "A building code should be reasonably related to the goals of public health, safety, and welfare. The exercise of police power cannot be used as a cloak to prevent the use of new materials and methods of construction merely because they are new and may displace older methods and materials. Home Building Contractors, Inc. v. County of Page 322 F. 2d 635, 637 (7th Cir. 1963)."

CUDAHY: This seems legally problematic to the code and IAPMO. "Nothing in this code" is deliberate, boilerplate language. Codes are not intended to prevent the use of designs or materials not prescribed.

FEEHAN: This language is confusing. Unless specifically prohibited means, everything that is not prohibited is allowed. Is that what you want a codebook to say? You better get your list of prohibited items started.

GORSUCH: I have a problem with the wording "specifically prohibited;" If the code specifically prohibits something today (in some cases), it may become obsolete tomorrow, and the code becomes incorrect or counterproductive. So, I think it is better to keep it the way it is.

KREITENBERG: The Code should not limit designers and or ingenuity.
The additional language is contrary to the intent of Section 301.3. The section allows the jurisdiction to evaluate alternate methods and make allowances. Most of the time the case could be made that the code specifically prohibits actions, specifically stating this will greatly inhibit jurisdictional latitude. The jurisdiction already has the option to say no to any of these proposed alternates.

**PUBLIC COMMENT 1**

**Code Year:** 2024 UPC  **Section #:** 301.3  **Item #:** 030

**SUBMITTER:** Phillip H Ribbs  
PHR Consultants  
**Comment #:** 1

**RECOMMENDATION:**

Revise text

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

301.0 General.

301.3 Alternate Materials and Methods of Construction Equivalency. Unless specifically prohibited **in this code**, nothing in this code is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this code. Technical documentation shall be submitted to the Authority Having Jurisdiction to demonstrate equivalency prior to installation. The Authority Having Jurisdiction shall have the authority to approve or disapprove the system, method, or device for the intended purpose.

However, the exercise of this discretionary approval by the Authority Having Jurisdiction shall have no effect beyond the jurisdictional boundaries of said Authority Having Jurisdiction. An alternate material or method of construction so approved shall not be considered as in accordance with the requirements, intent, or both of this code for a purpose other than that granted by the Authority Having Jurisdiction where the submitted data does not prove equivalency.

**SUBSTANTIATION:**

During the Assembly Consideration Meeting, IAPMO membership had the opportunity to reconsider this item, however, no concerns were mentioned for this item. Furthermore, the TC written ballot achieved the necessary 2/3 affirmative vote.

The proposed modification clarifies what the phrase “unless specifically prohibited” is intended for. The phrase is intended for this code only and addresses the negative TC comments expressed during the written ballot voting.

The modification Section 301.3 grants authority to AHJ’s to approve materials or products at their discretion. However, Section 301.3 places an obligation on the AHJ to approve only those alternate materials or products which comply "with the intent of this code," which are “at least the equivalent of that prescribed in this code," and are not specifically prohibited elsewhere in the code.

**PUBLIC COMMENT 2**

**Code Year:** 2024 UPC  **Section #:** 301.3  **Item #:** 030

**SUBMITTER:** Julius Ballanco, P.E.  
JB Engineering and Code Consulting, P.C.  
Rep. Self  
**Comment #:** 2

**RECOMMENDATION:**

Revise text

Request to **reject** the code change proposal by this public comment.
"Courts have held that a building code, which prohibits the use of materials and procedures not specified in the code and does not allow consideration of alternative products and methods, unfairly discriminates against all such products and methods other than those products. In 1936 the court held that the Chicago building code was invalid in that it prohibited the use of plasterboard which was as sanitary and fire-resistant as lath and plaster.

Two years later in Brewer v. Kelly, the court held that the code provision which required that windows be a minimum of seven feet from the floor did not apply to the innovative product called “casement windows.” Instead, the code provision specified the use of traditional sash windows. The court, in reaching its decision, inferred what performance was satisfied when a sash window was used. The court then evaluated casement windows against that performance and found them to meet the standard. On this basis, the court allowed the use of the innovative product.

Here the court sidestepped the constitutional challenge of invalidity and narrowly held that the innovative product was not governed by the allegedly prohibiting code section and, therefore, was eligible for consideration under the code. Of far greater significance was the court’s use of performance measures for determining the adequacy of an innovative product not specified in the code. While this case stands for the principle that codes cannot exclude acceptable products, its reasoning anticipates by several decades the need for an equivalency provision in the codes that is based on performance measures."

While this document dates back more than 40 years, in that period of time, no one with knowledge of code requirements for alternative approval have challenged the legal aspect of this section. This code proposal does just that by ignoring legal precedence regarding unfair discriminatory restrictive practices.

This change needs to be rejected so that the code does not violate U.S. Federal Law.
Proposals

Item #: 031
UPC 2024  Section: 301.6

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Add new text

301.0 General.

301.6 Tall Wood (Mass Timber) Buildings. Plumbing systems installed in Type IV-A, Type IV-B, or Type IV-C tall wood (mass timber) buildings, shall comply with the following:
(1) Be designed by a licensed plumbing contractor or a registered design professional in accordance with this code and the building code.
(2) Have a flame-spread index of not more than 25 and a smoke developed index of not more than 50, where tested in accordance with ASTM E84 or UL 723.
(3) Be designed to accommodate expansion, contraction, and differential movement between parts of a mass timber building.

SUBSTANTIATION:
The building codes include Type IV tall wood building (also known as mass timber construction) which are constructed with fire resistive ratings of either three or two hours. Proposed Section 301.6 provides information and direction for fire resistive ratings associated with mass timber construction.

Additionally, the language is adding prescriptive requirements for allowance of expansion and contraction of mass timber buildings either during or after completion of construction. Current studies are monitoring the moisture performance of mass timber building during construction utilizing monitors, and there is indication that the mass timber expands during construction and contracts over time. Proposed Section 301.6 provides guidance for the plumbing system design within wood buildings constructed of Type IV-A, Type IV-B, or Type IV-C.

COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC
Amend proposal as follows:

301.0 General.

301.6 Tall Wood (Mass Timber) Buildings. Plumbing systems installed in Type IV-A, Type IV-B, or Type IV-C tall wood (mass timber) buildings, shall comply with the following:
(1) Be designed by a licensed plumbing contractor or a registered design professional in accordance with this code and the building code.
(2) Have a flame-spread index of not more than 25 and a smoke developed index of not more than 50, where tested in accordance with ASTM E84 or UL 723.
(3) Be designed to accommodate expansion, contraction, and differential movement between parts of a mass timber building.

COMMITTEE STATEMENT:
The modification removes the plumbing system types (IV-A, IV-B, IV-C) as they are already referenced in the building code. Including the types may cause confusion for the users of the code.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 18 NEGATIVE: 7 NOT RETURNED: 1 Daniels

EXPLANATION OF NEGATIVE:

BALLANCO: This proposed change is not consistent with the Building Code. There are no provisions in the Building Code requiring plumbing systems to have a flame spread of 25 or less and a smoke develop index of 50 or less. This would eliminate the use of plastic pipes and plastic plumbing fixtures without any technical justification.

BROWN: The new language places restrictions on plumbing systems without adequate justification. This is inconsistent with the Building Code.

CUDAHY: All components of this proposal are unnecessary. Limiting design and construction of one type of building is overly restrictive, limiting piping to plenum piping is technically unjustified, and expansion and contraction engineering is needed in every type of construction. This should have failed.

FEEHAN: I am opposed to the entire proposal. If it is approved, it needs to include all types of buildings.

GORSUCH: Item numbers (1) and (3) are not unique to the tall mass timber buildings. More reasoning is required to provide a better justification why tall mass timber buildings require plenum piping.

KREITENBERG: It seems to be directing the plumbing systems to have a 25/50 rating. That is not consistent with the Plumbing Code.

WHITE: These restrictions are not justified. Tall buildings expand and contract, systems need to be designed by a professional, and there is no justification for the flame spread language.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 301.6 Item #: 031
SUBMITTER: Phillip H Ribbs PHR Consultants Comment #: 1

RECOMMENDATION: Revise text

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

301.0 General.

301.6 Tall Wood (Mass Timber) Buildings. Plumbing systems installed in tall wood (mass timber) buildings, shall comply with the following:

(1) Be designed by a licensed plumbing contractor or a registered design professional in accordance with this code and the building code.

(2) Have a flame spread index of not more than 25 and a smoke developed index of not more than 50, where tested in accordance with ASTM E84 or UL 723.

(3) Be designed to accommodate expansion, contraction, and differential movement between parts of a tall wood, (mass timber) building in accordance with Section 312.2.

SUBSTANTIATION:

During the Assembly Consideration Meeting, IAPMO membership had the opportunity to reconsider this item, however, no concerns were mentioned for this item. Furthermore, the TC written ballot achieved the necessary 2/3 affirmative vote.

The modification is removing “(2)” as the flame spread index and smoke developed index are clearly stated in Section 701.2, Section 903.1, and Section 1101.4 for plumbing systems.
Also, the modification adds "tall wood" to clarify that such buildings are also referred to "mass timber." As indicted in the original proposal, building codes include Type IV tall wood building (also known as mass timber construction) which are constructed with fire resistive ratings of either three or two hours. Proposed Section 301.6 provides information and direction for fire resistive ratings associated with mass timber construction.

Additionally, the language is being modified to add the pointer to the appropriate section (312.2) for expansion and contraction of buildings. Current studies are monitoring the moisture performance of mass timber building during construction utilizing monitors, and there is indication that the mass timber expands during construction and contracts over time.

The addition of Section 301.6 provides guidance for the plumbing system design within wood buildings constructed of Type IV-A, Type IV-B, or Type IV-C as defined in the building code.

I have provided supporting information on tall wood buildings, as follows:
1. Monitoring Moisture Performance of CLT
2. Type of Construction Comparison
3. WCTE 2018 Hygrothermal behavior of Mass Timber

[Supporting documentation provided in KAVI for TC review]

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PUBLIC COMMENT 2

**Code Year:** 2024 UPC  **Section #:** 301.6  **Item #:** 031

**SUBMITTER:** Julius Ballanco, P.E. (JB Engineering and Code Consulting, P.C., Rep. Self);  **Comment #:** 2
Michael Cudahy (PPFA); Kyle Thompson (Plumbing Manufacturers International
- PMI); Lance MacNevin (Plastic Pipe Institute); Paul Armstrong (American Wood Council - AWC)

**RECOMMENDATION:**
Delete text without substitution

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

**SUBSTANTIATION:**
**Julius Ballanco:**
While there is a claim of being consistent with the Building Code, the proposed text is NOT consistent. The Building Code has no requirement for plumbing systems to have a flame spread index of 25 or less and smoke developed index of 50 or less. What does this statement even mean? What plumbing systems.

If the requirement is intended to be all inclusive, it would not allow a plumbing system. Not one faucet has complete components that comply with the 25/50 provision. Even no-hub cast iron would fail since the elastomer in the no-hub coupling cannot meet 25/50. The internal component of a water closet or flush valve would not meet 25/50. Again, this statement is inappropriate for "plumbing systems," and not a Building Code requirement.

The statement regarding expansion and contraction is already addressed in Section 312.2. Nothing new is added that is not already addressed in Section 312.2. This proposal needs to be rejected.

**Michael Cudahy:**
Mass timber construction does not require additional limitations on materials or installation in the UPC or UMC. These proposed restrictions are technically unjustified, redundant in places when discussing expansion and contraction, and would create conflicts with the commonly adopted International Building Code and other building codes. If some unique engineering is required, we would expect the wood industry to include it in the building codes.

**Kyle Thompson:**
No technical justification was provided for including such a requirement in the plumbing code. These requirements conflict with the mechanical and building code. The fire resistance requirements for mass timber buildings are already addressed in the building code and plenum requirements are already included in the mechanical code. The definition of “Plumbing system” in the plumbing code includes plumbing fixtures. The requirements specified in this section would require plumbing fixtures such as bathtubs/shower, shower receptors/stalls, sinks, lavatories, and
water closets to have a flame spread index of not more than 25 and smoke developed index of not more than 50. Flammability requirements for plumbing fixtures are not currently required by the building code.

**Lance MacNevin:**
The addition of Sec. 301.6 was submitted without a technically supported Statement of Problem and Substantiation, and it is unclear what problems this new language is intending to resolve or prevent. Exposed wood within Mass Timber Buildings is subjected to ASTM E119 or UL 263 fire tests to demonstrate fire resistance, so there is no need to add new flame and smoke spread requirements for plumbing system components within these buildings.

Further, there are several technical issues with the proposed Sec. 301.6 which should be the basis for its rejection:

301.6: No definition is provided in this Code for a “Mass Timber Building,” so the application of this entire section is subject to misinterpretation.

301.6 (1): According to Sec. 104.3.1 of this code, it is currently required that “The construction documents, computations, and specifications shall be prepared by, and the plumbing designed by, a registered design professional.” There is no reason to restate this requirement for Mass Timber Buildings. Therefore, the new language is redundant and unnecessary.

301.6 (2): The International Building Code requires that Mass Timber Buildings shall meet fire resistance requirements as specified in that code but does not prescribe extraordinary fire resistance requirements for the plumbing systems used within mass timber buildings. Therefore, this proposal is inconsistent with the IBC and would eliminate the use of many safe plumbing components without any technical justification.

Further, the proposed Sec. 301.6 adds flame and smoke spread requirements that currently apply to materials installed within plenums (as per the Uniform Mechanical Code) to every plumbing system component within Mass Timber Buildings. In other words, this proposal treats the entire Mass Timber Building as a return air plenum, which has no technical justification and is not consistent with the IBC. If this is the intent, then a series of revisions should be added to the IBC to specify flame and smoke spread requirements for every building component within Mass Timber Buildings, not just plumbing components.

301.6 (2): According to Section 218.0 of this Code, the term “Plumbing System” is defined as “all potable water, alternate water sources, building supply, and distribution pipes; all plumbing fixtures and traps; all drainage and vent pipes; and all building drains and building sewers, including their respective joints and connections, devices, receptors, and appurtenances within the property lines of the premises and shall include potable water piping, potable water treating or using equipment, medical gas and medical vacuum systems, liquid and fuel gas piping, and water heaters and vents for same.” It is highly impractical and not justified to require every portion of the plumbing system to comply with these proposed requirements.

301.6 (3): According to Sec. 312.2 of this code, it is currently required that “Piping in connection with a plumbing system shall be so installed that piping or connections will not be subject to undue strains or stresses, and provisions shall be made for expansion, contraction, and structural settlement.” There is no reason to restate these requirements for plumbing systems in Mass Timber Buildings. Therefore, the new language is redundant and unnecessary.

In summary, these new restrictions are not justified, are redundant and unnecessary, would add confusion to this Code, and would create conflicts with the International Building Code and other building codes. Section 301.6 should be deleted.

**Paul Armstrong:**
The proposed new text is unnecessary and lacks justification. There is no technical justification for the limitations being placed on systems installed in “tall wood (mass timber) buildings.” Specifically, the following are relevant to the committee’s deliberations:

1) The phrase “tall wood (mass timber) buildings” as used in the proposed text is not defined and will lead to inconsistent and misinterpretation of the code.
2) The assertion that mass timber buildings are likely to experience expansion and contraction “over time” is incorrect. In fact, construction tolerance of mass timber building elements is more exact than with other materials. Also, the studies monitoring the moisture performance referenced in the reason statement are unknown to the American Wood Council.
3) The new types of mass timber recognized in the 2021 International Building Code and NFPA 5000 have life
safety safeguards for occupants and fire responders the exceed what is required for non-combustible buildings of the same height and of unlimited building area.

Use of the phrase “tall wood (mass timber) buildings:"
The phrase “tall wood (mass timber) buildings” is not a defined term in the building code, the term could easily be misinterpreted to include structures outside of the scope of Type IV-A, IV-B, and IV-C buildings. The 2021 IBC introduces new allowable height and area limitations for fire resistance rated mass timber buildings. These types of construction are in addition to what has historically been permitted for heavy timber construction, which remains unchanged in both model codes.

Dimensional Change in Mass Timber Buildings:
The provided substantiation relies heavily on the assertion that expansion or contraction of tall mass timber is not properly addressed in the building code and manufacturing process. The very nature of mass timber construction limits expansion and contraction. Tall mass timber is designed so that columns bear directly on end-grain, typically using a steel pedestal so the columns do not bear directly on the floor assembly. This is best illustrated in the following article, which states, “The amount a piece of wood will shrink lengthwise, called longitudinal shrinkage, is so small—typically about 0.1% to 0.2%—that it is usually inconsequential to the volumetric shrinkage…”
https://www.wood-database.com/wood-articles/dimensional-shrinkage/

Lumber used to manufacture Cross Laminated Timber (CLT) and glued laminated timber is dried to a pre-determined moisture content of between 10% - 12% prior to fabrication. The exact moisture content of the lumber may be selected based on the geographical location of the building for which it is being fabricated. This is done to closely replicate the final equilibrium moisture content that is expected based on the building location. This ensures the moisture content at the time of fabrication will closely resemble the final equilibrium moisture, thereby, mitigating dimensional change between the time of fabrication and building use. Mass timber will reach an equilibrium moisture content between 8% - 9% during the building’s useful life. When combined with typical detailing found in mass timber construction, dimensional change is minimal.

In The Brock Commons Project (an 18-story mass timber student housing building on the campus of the University of British Columbia in Vancouver) it is stated that the “tolerances are measured in millimeters.”
https://www.youtube.com/watch?v=Fmuj4XeHsbo

The precision of mass timber fabrication and machining is to the nearest millimeter. Mass timber construction generally results in tighter tolerances than steel or concrete construction. This is beneficial when prefabricating components of plumbing and mechanical systems. The dimensional changes along the length (and, for cross laminated timber (CLT), along the width) are negligible. In tall wood buildings, bearing of wood elements perpendicular to grain are avoided. Compression perpendicular to grain, is avoided by using steel pedestals to maintain column end-grain bearing through floor assemblies. Given the above points, it is not substantially different from other materials.

This proposal is also unnecessary. Chapter 23 of the International Building code already includes a requirement for shrinkage analysis (IBC 2304.3.3). It states:

2304.3.3 Shrinkage. Wood walls and bearing partitions shall not support more than two floors and a roof unless an analysis satisfactory to the building official shows that shrinkage of the wood framing will not have adverse effects on the structure or any plumbing, electrical or mechanical systems or other equipment installed therein due to excessive shrinkage or differential movements caused by shrinkage.

Given the above points, it is not substantially different from other materials.

Lastly, in the mass timber project Limnologen in Växjö, Sweden, it included very detailed expansion and contraction documentation. A scholarly journal concluded that the daily variation and sum annual movement in the wood was less than that of concrete and steel construction. https://www.semanticscholar.org/paper/Vertical-Displacements-in-a-Medium-rise-Timber-%3A-in-Zeng-Ren/c06fd3da2f39a5a226374398f521536e4ea8e0ad

Fire Performance of Mass Timber Buildings:
Mass timber construction requires safeguards not required by other construction types, not to mention the inherent fire resistance of the mass timber itself. All mass timber buildings must be sprinklered with a full NFPA 13 system. Shafts (where pipes would usually run) and concealed spaces must be covered with at least 40 minutes of noncombustible protection, usually one layer of 5/8th Type X gypsum fire rated wall board or manufactured from...
noncombustible materials. If the building is over 120 feet, it must have redundant water supplies, which means two fire pumps, fed by two independent water sources, from two different water mains.

Conclusion:
This proposal provides no technical justification for the proposed requirement, and provides no documentation, footnotes, or references to even verify its claims. The proposal is out of sync with the new building code requirements and places a restriction in the plumbing code that is unjustified. We ask that this proposal be rejected.
Proposals

Item #: 036
UPC 2024  Section: 310.9

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Add new text

310.0 Prohibited Fittings and Practices.

310.9 ABS and PVC Transition Joints. Except as provided in Section 705.9.4, PVC and ABS pipe and fittings shall not be solvent welded to any other unlike material.

(below shown for reference only)

705.9.4 Transition Joint. A solvent cement transition joint between ABS and PVC building drain and building sewer shall be made using listed transition solvent cement in accordance with ASTM D3138.

SUBSTANTIATION:
The current language under Section 705.9.4 allows for a single transition from ABS to PVC or PVC to ABS exterior of the structure. Transition glue is not being represented to be allowable to make transition joints between ABS and PVC anywhere in the building. This code change clarifies that this practice is not approved. I have seen residences where the below slab plumbing was PVC and then the above slab plumbing all PVC with the joints being made with transition glue. This is an improper use of the product. There is a separate code change to place this proposed change in Section 705.10.3; however, it is also important that this be in the general regulations as a prohibited practice.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 310.10  Item #: 036
SUBMITTER: Shane Peters
Self

RECOMMENDATION:
Revise text

Request to accept the code change proposal as modified by this public comment.
310.0 Prohibited Fittings and Practices.

310.10 ABS and PVC Transition Joints. Except as provided in Section 705.9.4, PVC and ABS pipe and fittings shall not be solvent welded to dissimilar any other unlike material.

SUBSTANTIATION:
This comment is cleaning up the language a little and subbing 'dissimilar' for 'unlike.' Dissimilar is a term already used in the UPC.
Proposals

Item #: 037
UPC 2024  Section: 310.9

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Add new text

310.0 Prohibited Fittings and Practices.

310.9 Female Plastic Connections. Female plastic threaded connections shall not be allowed to be used when threaded onto a male metallic connection.

SUBSTANTIATION:
It is common practice for installers to use female plastic fittings in installations where a male metal outlet is. This is common on condensate pans and HVAC units. It is often use at water services where a metal nipple is used. This issue is that this type of installation often cracks and then leaks or floods. When the female fitting is over tightened (which is hard not to do as there is no way to really torque it) it creates a stress on the fitting. Plastic products relieve stress by cracking. It is also important that this be in the general regulations as a clearly prohibited practice.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 310.9  Item #: 037
SUBMITTER: Lance MacNevin  Plastic Pipe Institute
Comment #: 1

RECOMMENDATION:
Revise text

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

310.0 Prohibited Fittings and Practices.

310.9 Female Plastic Connections. Female plastic tapered (NPT) threaded connections shall not be allowed to be used when threaded onto a male metallic connection.

Exception: Female plastic parallel (straight) threaded connections shall be permitted.
SUBSTANTIATION:
The proposed new Section 310.9, as accepted by the TC, would prohibit common exposed plumbing threaded connectors such as those used to connect faucets, toilets, etc. which typically use a plastic nut with straight parallel threads, as defined in ASME B1.20.1.

Parallel threaded nuts are not tapered and do not tighten against the male threads of such connections. Instead, they make a seal using an elastomer gasket against the inside bottom of the nut and the male threaded component. Therefore, there is no internal stress applied to the inside of the plastic nut that would force it to expand and split.

The public comment would clarify that this new prohibition in 310.9 is limited to tapered (NPT) threads, while providing an exception for parallel threads for clarity.

[Supporting documentation provided in KAVI for TC review]

PUBLIC COMMENT 2

Code Year: 2024 UPC  Section #: 310.9  Item #: 037
SUBMITTER: Kyle Thompson  Plumbing Manufacturers International (PMI)
Comment #: 2

RECOMMENDATION:
Revise text

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

310.0 Prohibited Fittings and Practices.

310.9 Female Plastic Connections. Female plastic NPT threaded connections shall not be allowed to be used when threaded onto a NPT male metallic connection.

Exception: Female plastic nuts with straight (parallel) threads connected to male metallic connections with straight (parallel) threads shall be permitted.

SUBSTANTIATION:
The cracking issue associated with tapered thread connections are not evident when using straight threaded connections. Straight threads do not create significant stress when tightened, as they seal using a gasket/washer rather than by tight physical mating of the threads. Straight female threads do not experience the stress and subsequent cracking potential that tapered female threads do, as evidenced by decades of common successful use of plastic straight threads in lavatory and sink waste assemblies, flexible connectors, and showerhead attachments.

This modification clarifies the intent of the original proposal, to avoid cracking of plastic to metal connections, and recognizes that this is a common issue with tapered thread connections such as those in condensate pans and HVAC units. Since this requirement is in the General Regulations section of the code there is no limit to its application only in HVAC or condensate waste. Without the clarification this requirement applies to all female plastic threaded connections made to male metallic connections. Disallowing straight female threaded connections to male metallic connections would prohibit the installation of many necessary products such as showerhead attachments, flexible connectors, P-Traps, and other mixed material waste assemblies. The following figures are a couple of examples of female plastic connections threaded onto male metallic connections.
PUBLIC COMMENT 3

Code Year: 2024 UPC  Section #: 310.9  
SUBMITTER: Shane Peters  
Self  

RECOMMENDATION:  
Revise text 

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

310.0 Prohibited Fittings and Practices.  

310.9 Female Plastic Connections. Female plastic threaded fittings shall be used with male plastic fittings only, not be allowed to be used when threaded onto a male metallic connection.

[the following sections are shown for informational purposes only]  

605.3.2 Mechanical Joints. Mechanical joints shall include flanged, grooved, and push fit fittings. 

605.12.3 Threaded Joints. Threads shall comply with ASME B1.20.1. A minimum of Schedule 80 shall be permitted to be threaded; however, the pressure rating shall be reduced by 50 percent. The use of molded fittings shall not result in a 50 percent reduction in the pressure rating of the pipe provided that the molded fittings shall be fabricated so that the wall thickness of the material is maintained at the threads. Thread sealant compound that is compatible with the pipe and fitting, insoluble in water and nontoxic shall be applied to male threads. Caution shall be used during assembly to prevent over tightening of the PVC components once the thread sealant has been applied. Female PVC threaded fittings shall be used with plastic male threads only.

705.6.3 Threaded Joints. Threads shall comply with ASME B1.20.1. A minimum of Schedule 80 shall be permitted to be threaded. Molded threads on adapter fittings for the transition to threaded joints shall be permitted. Thread sealant compound that is compatible with the pipe and fitting, insoluble in water and nontoxic shall be applied to male threads. The joint between the pipe and transition fitting shall be of the solvent cement type. Caution shall be used during assembly to prevent over tightening of the PVC components once the thread sealant has been applied. Female PVC threaded fittings shall be used with plastic male threads only.

814.7 Plastic Fittings. Female plastic screwed fittings shall be used with male plastic fittings and plastic threads.

SUBSTANTIATION:  
This change will make the section easier to read and will mirror the language in Section 605.2.3, Section 605.12.3, Section 705.6.3 and Section 814.7.
PUBLIC COMMENT 4

Code Year: 2024 UPC Section #: 310.9 Item #: 037

SUBMITTER: Michael Cudahy PPFA

Comment #: 4

RECOMMENDATION:
Delete without substitution

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

SUBSTANTIATION:
While we do not recommend the use of plastic female adapter taper fittings on metal systems that undergo significant temperature changes, if included in the 2024 UPC, this proposal will disrupt the industry as it would apply to all female plastic threaded connections made to male metallic connections, and disallow common products such as shower head attachments, flexible connectors, P-Traps, and mixed material waste assemblies. There are threaded transition fittings that seal on gaskets designed for the applications as well. PPFA urges rejection.
Proposals

Item #: 041

UPC 2024  Section: 313.0, 313.1, 313.2

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

313.0 Hangers, and Supports, and Anchors.
313.1 General. Piping, fixtures, appliances, and appurtenances shall be supported in accordance with this code, the manufacturer’s installation instructions, and in accordance with the Authority Having Jurisdiction. Seismic restraints shall be in accordance with the building code.
313.2 Material. Hangers, supports, and anchors shall be of sufficient strength to support the weight of the pipe and its contents. Piping shall be isolated from incompatible materials.

SUBSTANTIATION:
The proposed text is adding seismic restraints to ensure these provisions are not overlooked when designing or working in areas prone to seismic conditions. Additionally, “anchors” is being added to the title as the subsections also include anchors.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

The TCC has the responsibility to resolve conflicts and achieve correlation among the recommendations of the Technical Committee. The TCC has the authority to choose between alternative text recommended by the Technical Committee, but only as necessary for correlation, consistency, and the correction of errors and omissions in accordance with Section 3-4 of the Regulations Governing Committee Projects.

Actions taken on UPC Item # 041, Section 313.1 (General) and Section 313.2 (Material) and UMC Item # 080, Section 313.1 (General) and Section 313.2 (Material) resulted in conflicting language between the codes. In order to correlate the language, the Technical Correlating Committee proposed the following modifications to the UPC:

313.0 Hangers, Supports, and Anchors.
313.1 General. Piping, tubing, fixtures, appliances, and appurtenances shall be supported in accordance with this code, the manufacturer’s installation instructions, and in accordance with the Authority Having Jurisdiction. Seismic restraints shall be in accordance with the building code.
313.2 Material. Hangers, supports, and anchors shall be of sufficient strength to support the weight of the pipe or tubing and its contents. Piping or tubing shall be isolated from incompatible materials.

TCC ACTION: ACCEPT AS SUBMITTED

TCC STATEMENT:
The language in UPC Item # 041, Section 313.1 (General) and Section 313.2 (Material) are being revised to correlate with the action taken by the UMC TC for Item # 080, Section 313.1 (General) and Section 313.2 (Material) to include the term “tubing.”
The action moves forward as approved by the TCC and supersedes the recommendation from the UPC TC for actions taken for Section 313.1 and Section 313.2 regarding the inclusion of the term “tubing.”

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024 UPC  Section #: 313.2, 313.7, Table 1701.1, Table 1701.2  Item #: 041
SUBMITTER: Phillip H Ribbs  PHR Consultants  Comment #: 1
RECOMMENDATION:
Revise text
Request to accept the code change proposal as modified by this public comment.

313.0 Hangers, Supports, and Anchors.

313.2 Material. Hangers, supports, and anchors shall be of sufficient strength to support the weight of the pipe or tubing and its contents. Piping or tubing shall be isolated from incompatible materials. Pipe support hangers and hooks shall comply with IAPMO PS 95 or shall be of an approved material.

313.7 Gas Piping. Gas piping shall be supported by metal straps or hooks in accordance with Section 1210.3.5 at intervals not to exceed those shown in Table 1210.3.5.1.

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
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<td>REFERENCED STANDARDS</td>
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<th>REFERENCED SECTION</th>
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<td>Pipe Support Hangers and Hooks</td>
<td>Hangers and Supports</td>
<td>313.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO PS 95 meets the requirements for mandatory reference standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

<table>
<thead>
<tr>
<th>TABLE 1701.2</th>
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<td>STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES</td>
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<tbody>
<tr>
<td>IAPMO PS 95-2018 &amp;4</td>
<td>Pipe Support Hangers and Hooks</td>
<td>DWV Components</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

(below shown for reference only)

1210.3.5 Hangers, Supports, and Anchors. Piping shall be supported with metal pipe hooks, metal pipe straps, metal bands, metal brackets, metal hangers, or building structural components, suitable for the size of piping, of adequate strength and quality, and located at intervals so as to prevent or damp out excessive vibration. Piping shall be anchored to prevent undue strains on connected appliances and equipment and shall not be supported by other piping. Pipe hangers and supports shall conform to the requirements of MSS SP-58. [NFPA 54:7.2.6.1]

SUBSTANTIATION:
Chapter 3 (General) applies to the entire UPC unless specifically specified elsewhere in the code. Section 313.7 (Gas Piping) is being modified to add a reference as pipe, hangers and supports for fuel gas piping must meet the requirements of Section 1210.3.5.
Additionally, IAPMO PS 95 is being added to Section 313.2 as it is a standard for pipe support hangers and hooks for use in DWV systems. The language will also allow the use of other approved existing methods that are field installed.
Proposals

Item #: 042

UPC 2024  Section: 313.4 - 313.6

SUBMITTER: Armando Barragan
Self

RECOMMENDATION:
Add new text

313.0 Hangers and Supports.

313.4 Seismic-Support. Where required by the building code, seismic restraints, anchorage, supports, and bracing for plumbing piping shall be provided in accordance with the building code.

313.5 Horizontal Restraints. Drainage piping that makes a horizontal-to-horizontal change in direction greater than 45 degrees (0.79 rad) shall be supported by one of the following methods or by other approved means:
(1) Suspended drainage piping 4 inches (102 mm) or larger shall be rigidly supported by bracing or similar restraint to resist the pipe movement in the direction of flow.
(2) Drainage piping 4 inches (102 mm) or larger supported in trenches shall be restrained to prevent separation of fittings using thrust blocking or similar restraint.

313.6 Axial Movement. Drainage piping shall be anchored or similarly restrained to prevent axial movement between joints.

(renumber remaining sections)

SUBSTANTIATION:
There are currently no provisions that speak on the thrust forces from the momentum of the waste within drainage piping. The combination of the mass and velocity can create a force that can quite large and can cause damage to the piping, fittings, or surrounding. These provisions need to be taken into account when the drainage piping makes sharp turns beyond a 45 degree angle. Additionally, there needs to be a reference for protection against seismic forces.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed language is overly restrictive as this would require thrust blocking to be installed for all piping in the drainage system 4” or larger. This is not applicable to all applications or installations. Seismic zoning should be used to make this determination.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 313.4  Item #: 042
SUBMITTER: Armando Barragan  Comment #: 1
RECOMMENDATION:
Add new text

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

313.0 Hangers, Supports, and Anchorage.

313.4 Horizontal Restraints Sway Bracing. Drainage piping 4 inches (102 mm) in diameter or larger that makes a horizontal-to-horizontal change in direction greater than 45 degrees (0.79 rad) shall be rigidly supported by bracing or similar restraint to resist the pipe movement in the direction of flow. A change from horizontal drainage to vertical drainage pipe shall not require sway bracing.

(renumber remaining sections)

SUBSTANTIATION:
This proposed comment is being updated to address the Technical Committees concern regarding thrust blocking. Thrust blocking was removed as it may not be applicable as the TC indicated and may cause confusion.

However, it is still important to address forces in horizontal changes in direction that may cause damaging forces to joints and connections for drainage piping. The updated comment is adding new Section 313.4 (Sway bracing) which is a side-to-side movement of plumbing drainage piping and is currently silent in the code. The combination of the mass and velocity of drainage flow can create a force that can be quite large and can cause damage to the piping, fittings, or surroundings if not properly supported. Such sway action could cause problems with piping joints and hanger systems. These provisions need to be considered when the drainage piping makes sharp turns beyond a 45 degree angle. Angles less than 45 degrees are not considered to cause a large enough force when the drainage changes direction to cause movement of the drainage piping. This is the angle that is used in other jurisdictions and codes.
Proposals

Item #: 044
UPC 2024  Section: 205.0, 208.0, 211.0, 318.0 – 318.6

SUBMITTER: Jeff Hutcher
Building in California
Rep. Self

RECOMMENDATION:
Add new text

318.0 Indoor Cannabis and Horticulture Facilities.
318.1 General. Plumbing for indoor horticulture spaces, including cannabis facilities, shall be in accordance with this code. This section shall apply to indoor horticulture within new and existing buildings.
318.2 Horticulture Facilities Water Supply. Potable water lines supplying water for irrigation purposes shall be provided with back-flow preventers to protect the domestic water supply from contamination in accordance with Table 603.2.
318.2.1 Alternate Water Supply. Where permitted, recycled and reclaimed water shall be permitted to be used for indoor horticulture in accordance with Chapter 15 or Chapter 16. Water tanks used for fertigation shall be listed for chemical use. Tanks stored in exterior of shall not be clear or translucent to prevent algae growth.
318.3 Floor Drains and Receptors. Fertigation water shall discharge through floor drains or other approved receptors receiving the waste from grow tables. Drains shall be trapped and vented in accordance with Chapter 10.
Exception: Class 1, Division 1 (C1/D1) rooms shall not contain floor drains.
318.3.1 Floor Drain Material. Floor drain material shall be in accordance with Section 418.1.
318.4 Emergency Equipment Stations. Eyewash stations shall be required in accordance with Section 416.2.
318.5 Nutrient Supply Equipment. Nutrient water tanks shall be installed in accordance with the manufacturer’s instructions. Potable water to nonpotable water connections shall be protected by an air gap or a reduced zone pressure (RZP) backflow device.
318.6 Nonpotable Water Tank. Nonpotable water storage tanks used for irrigation shall be in accordance with Chapter 15 or Chapter 16.

Definitions:

205.0 – C – Cannabis Facility. A business, facility, or establishment where retail Cannabis is grown, cultivated, tested, stored, dried, extracted, weighed, packaged, sold, or processed, including dispensaries, cultivators, manufacturers, distributors, or testing laboratories.

208.0 – F – Fertigation. The process of injecting nutrients into the irrigation water.

211.0 – I – Indoor Horticulture. The cultivation and processing of floricultural and horticultural plants, including cannabis, in an indoor space by controlling various interior environmental variables including, but not limited to, temperature, air quality, humidity, artificial lighting, nutrients, and carbon dioxide.

SUBSTANTIATION:
This code change adds plumbing requirements for cannabis and horticulture facilities, including protection of water supply, alternate water sources and means of draining such systems. Growing plants transpire wastewater that may require special attention because of the necessities of cannabis which include water, nutrients, and a growing medium. To maximize public health and safety, potable water protection, and protection of the plumbing system, such requirements must be maintained.
Amend proposal as follows:

Appendix T
Indoor Cannabis and Horticulture Facilities

T 101.0 348.0 Indoor Cannabis and Horticulture Facilities.
T 101.1 348.4 General. Plumbing for indoor horticulture spaces, including cannabis facilities, shall be in accordance with this code. This section shall apply to indoor horticulture within new and existing buildings.

T 102.0 Definitions:
205.0 – C – Cannabis Facility. A business, facility, or establishment where retail Cannabis is grown, cultivated, tested, stored, dried, extracted, weighed, packaged, sold, or processed, including dispensaries, cultivators, manufacturers, distributors, or testing laboratories.
208.0 – F – Fertigation. The process of injecting nutrients into the irrigation water.
211.0 – I – Indoor Horticulture. The cultivation and processing of floricultural and horticultural plants, including cannabis, in an indoor space by controlling various interior environmental variables including, but not limited to, temperature, air quality, humidity, artificial lighting, nutrients, and carbon dioxide.

T 103.0 Requirements.
T 103.1 348.2 Horticulture Facilities Water Supply. Potable water lines supplying water for irrigation purposes shall be provided with back-flow preventers to protect the domestic water supply from contamination in accordance with Table 603.2.
T 103.1.1 348.2.1 Alternate Water Supply. Where permitted, recycled and reclaimed water shall be permitted to be used for indoor horticulture in accordance with Chapter 15 or Chapter 16. Water tanks used for fertigation shall be listed for chemical use. Tanks stored in exterior of shall not be clear or translucent to prevent algae growth.
T 103.2 348.3 Floor Drains and Receptors. Fertigation water shall discharge through floor drains or other approved receptors receiving the waste from grow tables. Drains shall be trapped and vented in accordance with Chapter 10.
Exception: Class 1, Division 1 (C1/D1) rooms shall not contain floor drains.
T 103.3 348.4 Emergency Equipment Stations. Eyewash stations shall be required in accordance with Section 416.2.
T 103.4 348.5 Nutrient Supply Equipment. Nutrient water tanks shall be installed in accordance with the manufacturer’s instructions. Potable water to nonpotable water connections shall be protected by an air gap or a reduced zone pressure (RZP) backflow device.
T 103.5 348.6 Nonpotable Water Tank. Nonpotable water storage tanks used for irrigation shall be in accordance with Chapter 15 or Chapter 16.

COMMITTEE STATEMENT:
These provisions are important but would be better suited as an appendix to allow further development to this specific need.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 18 NEGATIVE: 7 NOT RETURNED: 1 Daniels

EXPLANATION OF AFFIRMATIVE:
FEEHAN: Because it is being moved to the appendix, I am voting in favor. It still needs some work.

RIBBS: I agree that the title needs to be changed, but I believe the Task Group will make the change. However, I agree with the TC action of relocating the proposal to an appendix is correct.

EXPLANATION OF NEGATIVE:
BALLANCO: I agree with Domenico Barbato that the word “cannabis” should not be used in the section. Let the Task Group address the needed changes on this subject.
BARBATO: Currently, cannabis is not legal at the federal level, therefore the word "cannabis" should be changed to the word "hydroponic culture."

CUDAHY, GORSUCH, SENECAUT: Agree with Domenico Barbato.

KREITENBERG: Important and needed but to a far greater extent and detail. Should also be in the appendix.

RODIO: The word "cannabis" should not be used. It is still a controlled substance Federally. This would make a great appendix for the states that have legalized it.

APPENDIX T

INDOOR CANNABIS AND HORTICULTURE FACILITIES

T 101.0 Indoor Cannabis and Horticulture Facilities.
T 101.1 General. Plumbing for indoor horticulture spaces, including cannabis facilities, shall be in accordance with this code. This appendix shall apply to primary and secondary horticulture facilities indoor horticulture within new and existing buildings.

T 102.0 Definitions.
T 201.0 General. For the purpose of this appendix, the following definitions shall apply:
Agricultural Water. Water used in indoor horticulture activities where water is intended to contact plants.
Cultivation Room. A room of any size where plants are grown under controlled conditions. Also known as a grow room.
Fertigation. The process of injecting nutrients into the irrigation water.
Horticulture Cannabis Facility. A business, facility, or establishment where indoor horticulture is grown, cultivated, tested, stored, dried, extracted, weighed, packaged, sold, or processed, including dispensaries, cultivators, manufacturers, distributors, or testing laboratories.
Indoor Horticulture. The cultivation and processing of floricultural and horticultural plants, including cannabis, in an indoor space by controlling various interior environmental variables including, but not limited to, temperature, air quality, humidity, artificial lighting, nutrients, and carbon dioxide.
Indoor Horticulture Water Distribution Systems. A system to supply water from its primary source to its point of use, including but not limited to pipes, sprinklers, irrigation equipment, pumps, valves, storage tanks, meters, and fittings.
Nutrient. Substances, chemicals, or ingredients used to promote growth, provide energy, and/or sustain plants.
Plant. A multicellular organism having cellulose cell walls intended for human consumption, ingestion, inhalation, or topical application.
Primary Horticulture Facility. A facility devoted to the growing and/or harvesting of plants. Cultivation rooms are located within these facilities.
Secondary Horticulture Facility. A facility devoted to harvesting (such as hulling or shelling), packing, and/or holding of plants.

T 301.0 Classification of Facilities.
T 301.1 General. Facilities used for indoor horticultural cultivation and processing shall be in accordance with the applicable codes as mandated by the Authority Having Jurisdiction.
T 301.2 Approved Locations. Facilities used for indoor horticultural cultivation and processing shall be located in accordance with the building code and the Authority Having Jurisdiction.
401.0 Documentation.
401.1 General. Documentation for permitting shall be provided in accordance with the requirements of Section 104.0 and the Authority Having Jurisdiction. The documentation shall show compliance with this section and other requirements in accordance with the Authority Having Jurisdiction.

401.0-501.0 Requirements-General.
501.1 Mechanical Systems. Indoor horticulture mechanical systems shall be in accordance with the Mechanical Code.
501.2 Fire Suppression Systems. Fire suppression systems shall be in accordance with the building code and fire code.
501.3 Emergency Eyewash and Shower Equipment Stations. Emergency shower and eyewash stations equipment shall be required in accordance with Section 416.0.

401.0 Water Supply.
601.1 General. Indoor horticulture water distribution systems shall be supplied with potable water in accordance with Chapter 6.
601.2 Materials. Pipe, tube, and fitting materials in contact with potable water, drinking water, or both shall be in accordance with Section 604.0.
601.3 Protection Horticulture Facilities Water Supply. Potable water lines supplying water piping used for irrigation purposes shall be equipped with an approved backflow prevention device or assembly provided with back-flow preventers to protect the domestic water supply from contamination in accordance with Table 603.2.
601.4 Alternate Water Supply. Where permitted, agricultural water may be used or alternate water sources in accordance with Appendix K, recycled and reclaimed water shall be permitted to be used for indoor horticulture in accordance with Chapter 15 or Chapter 16. Water tanks used for fertigation shall be listed for chemical use. Tanks stored in exterior shall not be clear or translucent to prevent algae growth.

401.0 Storage Tanks.
701.1 Construction. Where storage tanks are used, they shall be approved by the Authority Having Jurisdiction. Potable water storage tanks shall comply with Section 607.0. Rainwater catchment storage tanks shall comply with Appendix K or in accordance with the Authority Having Jurisdiction.

401.0 Fertigation and Irrigation Equipment.
801.1 Installation Nutrient Supply Equipment. Nutrient water tanks and irrigation equipment shall be installed in accordance with the manufacturer’s instructions. When connected to the potable water supply, tanks and irrigation equipment shall be located downstream of water storage tank and be protected by an approved backflow device or method in accordance with Table 603.4. Potable water to nonpotable water connections shall be protected by an air gap or a reduced zone pressure (RZP) backflow device.
801.2 Materials and Construction. The piping, components, and devices shall be compatible with the additives or nutrients used. Above grade storage tanks shall be of an opaque material, approved for aboveground use in direct sunlight, or shall be shielded from direct sunlight.

401.0 Sanitary Drainage and Indirect Wastes.
901.1 General. Sanitary drainage shall be in accordance with Chapter 7. Indirect wastes shall be in accordance with Chapter 8. The drainage system shall be compatible with the discharge liquid waste.
901.2 Hazardous Materials. Hazardous materials shall not be discharged into the sanitary sewer, storm drain, or on the ground.
901.3 Agricultural Water Waste. Agricultural water shall be discharged in accordance with the local, state, and federal regulations as approved by the Authority Having Jurisdiction. Where agricultural water discharges to the outdoors, and is not connected to the sanitary sewer, the piping shall be installed as to restrict rodents or vermin from entering the building.
901.4 Floor Drains, Floor Sinks, and Receptors. Wastewater shall discharge into an approved receptor. Receptors shall be compatible with the wastewater and installed in accordance with this code. Fertigation water shall discharge through floor drains or other approved receptors receiving the waste from grow tables. Drains shall be trapped and vented in accordance with Chapter 10. Exception: Class 1, Division 1 (C1/D1) rooms shall not contain floor drains.
901.5 Nonpotable Water Tank. Nonpotable water storage tanks used for irrigation shall be in accordance with Chapter 15 or Chapter 16.
901.6 Plant Storage Areas. Where drains are provided in spaces where plants are stored, such drains shall be installed with indirect waste piping. Each indirect waste pipe from plant storage areas shall be separately piped to the indirect waste receptor and shall not combine with other indirect waste pipes.
**T 1001.0 Facilities.**

**T 1001.1 Toilet Facilities.** Toilet facilities shall be provided in accordance with the Occupancy Type.

**T 1001.2 Location.** Toilet facilities shall be located in such a manner to prevent contamination of plants during harvesting, holding, manufacturing/processing, and packing.

**SUBSTANTIATION:**

The Task Group was formed during the last UPC TC meeting as the TC believed these were important provisions for the UPC and needed refinement and further expansion.

The number one focus of the task group is to protect the health and safety of the public. Each of the original proposed categories from UPC proposal Item #044 were discussed in depth and expanded. The Task Group agreed with the TC recommendation to place these provisions in an appendix and agreed that the term “cannabis” should be removed as it may be applicable to other forms of indoor horticulture facilities.

The task group believed it was important to identify the different categories of “horticulture facilities” as they exist in current federal laws. This will minimize confusion and make the language standard throughout the industry.

This UPC Task Group communicated with the UMC Indoor Horticulture Facilities Task Group to harmonize text where applicable to both codes. Some members were on both the UPC and UMC committees.

The new provisions in Section T 301.0 (Classification of Facilities) will guide the end user in determining what is acceptable in their jurisdictions whether it be from the building code, fire code, or any other enforcement body. Additionally, Section T 401.0 (Documentation) was added to guide the user to the appropriate sections for requesting permits.

Section T 901.3.1 (Plant Storage Areas) is being added as floor drains located in plant storage areas are required to drain to the drainage system by means of indirect drainage. This ensures that if there is backflow in the system, it will not enter the plant storage area and contaminate the plant.

Section T 1001.0 (Facilities) was added to ensure that these facilities are identified with an occupancy type in accordance the local jurisdiction.

The Task Group spent many hours researching and identifying water sources permitted for indoor horticulture facilities and added the appropriate language and provisions to protect the potable water supply. The language pertaining to water sources was based on research of existing sources such as technical research documents, standards, local laws, and Federal Regulation. The result was text that will unify with existing laws and regulations.

In summary, the UPC Indoor Horticulture Facilities Task Group has captured important minimum requirements that do not conflict with Federal Regulations and will ensure that local laws and guidelines are followed for the protection of the public.
402.0 Installation.

402.6.1 Closet Rings (Closet Flanges). Closet rings (closet flanges) for water closets or similar fixtures shall be of an approved type and shall be copper alloy, copper, hard lead, cast-iron, galvanized malleable iron, ABS, PVC, or other approved materials. Each such closet ring (closet flange) shall be approximately 7 inches (178 mm) in diameter and, where installed, shall, together with the soil pipe, present a 1 1/2 inch (38 mm) wide flange or face to receive the fixture gasket or closet seal.

Caulked-on closet rings (closet flanges) shall be not less than 1/4 of an inch (6.4 mm) thick and not less than 2 inches (51 mm) in overall depth.

Closet rings (closet flanges) shall be burned or soldered to lead bends or stubs, shall be caulked to cast-iron soil pipe, shall be solvent cemented to ABS and PVC, and shall be screwed or fastened in an approved manner to other materials.

Closet bends or stubs shall be cut-off to present a smooth surface even with the top of the closet ring before the rough inspection is called. Where the closet ring is installed on the closet bend or riser, the finished joint shall be present a smooth surface flush with the top of the closet ring.

Closet rings (closet flanges) shall be adequately designed with the bottom of the ring or flange positioned on the finished floor and secured to support fixtures connected thereto.

Offset closet rings (closet flanges) shall be free of ledges and corners that would obstruct flow shall be permitted for floor discharge water closets.

402.6.3 Securing Floor-Mounted, Back-Outlet Water Closet Bowls. Floor-mounted, back-outlet water closet bowls shall be set level with an angle of 90 degrees (1.57 rad) between the floor and wall at the centerline of the fixture outlet. The floor and wall shall have a flat mounting surface not less than 5 inches (127 mm) to the right and left of the fixture outlet centerline. The fixture shall be secured to the wall outlet flange or drainage connection and the floor by corrosion resistant screws or bolts. The closet flange shall be firmly secured to a firm base. Where floor mounted, back-outlet water closets are used, the soil pipe shall be not less than 3 inches (80 mm) in diameter. Offset, eccentric, or reducing closet flanges shall not be used permitted with these fixtures.

SUBSTANTIATION:
For Section 402.6.1:
(Paragraph 4) Since closet flanges (closet flange) are unlikely to be installed, for dozens of reasons, before the rough inspection is called, that language should be eliminated. It is likely unenforceable because rarely has a finished floor level been established.
(Paragraph 5) The question has been asked thousands of time as to where the closet flange sets in relation to the floor. Here it is answered… it is designed to sit on and be securely attached to the “finished floor.” One of the reasons for the problem in paragraph 2.
(Last paragraph) This is an often asked question which needs a direct answer in the text of the code. The last paragraph of Section 402.6.3 is sometimes mistakenly used to prevent ANY offset closet ring.

For Section 402.6.3, the proposed language will make the language concise and clarify the intent of the section. Pipe size is not needed, it is clearly addressed in Tables 702.1 and 703.2.
COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The current language already has the necessary requirements for the installation of closet rings. The proposed language is subjective and the text “positioned on the finished floor” creates confusion.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024 UPC Section #: 402.6.1
SUBMITTER: Shane Peters Self

RECOMMENDATION:
Revise text

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

402.0 Installation.

402.6 Flanged Fixture Connections. (remaining text unchanged)
402.6.1 Closet Rings (Closet Flanges). Closet rings (closet flanges) for water closets or similar fixtures shall be of an approved type and shall be copper alloy, copper, hard lead, cast-iron, galvanized malleable iron, ABS, PVC, or other approved materials. Each such closet ring (closet flange) shall be approximately 7 inches (178 mm) in diameter and, where installed, shall, together with the soil pipe, present a 1-1/2 inch (38 mm) wide flange or face to receive the fixture gasket or closet seal.

Caulked-on closet rings (closet flanges) shall be not less than 1/4 of an inch (6.4 mm) thick and not less than 2 inches (51 mm) in overall depth.

Closet rings (closet flanges) shall be burned or soldered to lead bends or stubs, shall be caulked to cast-iron soil pipe, shall be solvent cemented to ABS and PVC, and shall be screwed or fastened in an approved manner to other materials.

Closet bends or stubs shall be cut-off to present a smooth surface even with the top of the closet ring before the rough inspection is called. When the closet ring is installed on the closet bend or riser, the finished joint shall present a smooth surface, flush with the top of the closet ring.

Closet rings (closet flanges) shall be adequately designed and secured to support fixtures connected thereto.

SUBSTANTIATION:
Those who have worked in the field recognize the language here is inconsistent with what actually happens. The code requires the top of the closet bend or stub to present a smooth surface with the top of the closet flange BEFORE the rough inspection is called. Note, it does not say the flange has to be attached to the bend or riser.

There are dozens of ways to screw this part of the plumbing installation up, especially in custom homes.

Based on a previous code change, the installer must know the elevation of the finished floor, because that is the elevation the bottom of the closet flange is located at.

Just about the time we think we have the floor level established, and the concrete poured, somebody moves the cheese, the floor level has changed.

What ensues is either breaking up the concrete, or whatever floor is there, and changing the stub or riser length. Or just as — or perhaps more common, is that the flange someone attached to the closet bend or stub is now 2 inches below the finish floor.
When it comes time to set the closet, the installer gets a deep closet ring set with an extra thick wax ring and 3-1/2 inch closet bolts. There are other solutions, some better than others, but none as good as if it had been done properly in the first place.

Since closet flanges (closet flange) are unlikely to be installed (mainly because of the previous scenario or for some other reason) before the rough inspection is called, that language should be eliminated and eliminate a potential conflict with the inspector. It is likely unenforceable because rarely has a finished floor level been established.

Then add what is included in the proposal, "When the flange is installed the stub or riser can be the accurate dimension to present a smooth surface even with the top of the flange."

PUBLIC COMMENT 2

**Code Year:** 2024 UPC  **Section #:** 402.6.1

**SUBMITTER:** Douglas Kirk  
Self

**RECOMMENDATION:**
Revise text

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

402.0 Installation.

402.6 Flanged Fixture Connections. (remaining text unchanged)

402.6.1 Closet Rings (Closet Flanges). Closet rings (closet flanges) for water closets or similar fixtures shall be of an approved type and shall be copper alloy, copper, hard lead, cast-iron, galvanized malleable iron, ABS, PVC, or other approved materials. Each such closet ring (closet flange) shall be approximately 7 inches (178 mm) in diameter and, where installed, shall, together with the soil pipe, present a 1-1/2 inch (38 mm) wide flange or face to receive the fixture gasket or closet seal.

Caulked-on closet rings (closet flanges) shall be not less than 1/4 of an inch (6.4 mm) thick and not less than 2 inches (51 mm) in overall depth.

Closet rings (closet flanges) shall be burned or soldered to lead bends or stubs, shall be caulked to cast-iron soil pipe, shall be solvent cemented to ABS and PVC, and shall be screwed or fastened in an approved manner to other materials.

Closet bends or stubs shall be cut-off to present a smooth surface even with the top of the closet ring before the rough inspection is called.

Closet rings (closet flanges) shall be adequately designed and secured to support fixtures connected thereto.

**SUBSTANTIATION:**
The proposed change simplifies and eliminates unnecessary language.

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PUBLIC COMMENT 3

**Code Year:** 2024 UPC  **Section #:** 462.6.1

**SUBMITTER:** Shane Peters  
Self

**RECOMMENDATION:**
Revise text

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

402.6 Flanged Fixture Connections. (remaining text unchanged)

402.6.1 Closet Rings (Closet Flanges). Closet rings (closet flanges) for water closets or similar fixtures shall be of an approved type and shall be copper alloy, copper, hard lead, cast-iron, galvanized malleable iron, ABS, PVC, or other approved materials. Closet rings shall be in accordance with the following:

1) Each such closet ring (closet flange) shall be approximately 7 inches (178 mm) in diameter and, where installed, shall, together with the soil pipe, present a 1-1/2 inch (38 mm) wide flange or face to receive the fixture gasket or closet seal.

2) Caulked-on closet rings (closet flanges) shall be not less than 1/4 of an inch (6.4 mm) thick and not less than 2 inches (51 mm) in overall depth.

3) Closet rings (closet flanges) shall be burned or soldered to lead bends or stubs, shall be caulked to cast-iron soil pipe, shall be solvent cemented to ABS and PVC, and shall be screwed or fastened in an approved manner to other materials.

4) Closet bends or stubs shall be cut-off to present a smooth surface even with the top of the closet ring before the rough inspection is called.

5) Closet rings (closet flanges) shall be adequately designed and secured to support fixtures connected thereto.

SUBSTANTIATION:
This formatting makes the section easier to read and designate individual requirements.
Proposals

Item #: 050
UPC 2024  Section: 402.6.1

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Revise text

402.0 Installation.

402.6 Flanged Fixture Connections. (portions of text not shown remains unchanged)
402.6.1 Closet Rings (Closet Flanges). Closet rings (closet flanges) for water closets or similar fixtures shall be of an approved type and shall be copper alloy, copper, hard lead, cast-iron, galvanized malleable iron, ABS, PVC, or other approved materials. Each such closet ring (closet flange) shall be approximately 7 inches (178 mm) in diameter and, where installed, shall, together with the soil pipe, present a 1 1/2 inch (38 mm) wide flange or face to receive the fixture gasket or closet seal.
   Caulked-on closet rings (closet flanges) shall be not less than 1/4 of an inch (6.4 mm) thick and not less than 2 inches (51 mm) in overall depth.
   Closet rings (closet flanges) shall be joined as approved for the specific material in accordance with Section 705.0 burned or soldered to lead bends or stubs, shall be caulked to cast-iron soil pipe, shall be solvent cemented to ABS and PVC, and shall be screwed or fastened in an approved manner to other materials.
   Closet bends or stubs shall be cut-off to present a smooth surface even with the top of the closet ring before the rough inspection is called.
   Closet rings (closet flanges) shall be adequately designed and secured to support fixtures connected thereto.

(below shown for reference only)

705.0 Joints and Connections.

SUBSTANTIATION:
Cleans up the language by eliminating all the ways the closet ring or flange shall be joined to the riser and just references Section 705.0 (Joints and Connections).

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The current language better addresses the joining methods of closet rings. The reference to Section 705.0 is too broad and may cause confusion.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 402.6.1  Item #: 050
SUBMITTER: Shane Peters  Self
Comment #: 1

RECOMMENDATION:
Revise text

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

402.0 Installation.

402.6 Flanged Fixture Connections. (remaining text unchanged)
402.6.1 Closet Rings (Closet Flanges). Closet rings (closet flanges) for water closets or similar fixtures shall be of an approved type and shall be copper alloy, copper, hard lead, cast-iron, galvanized malleable iron, ABS, PVC, or other approved materials. Each such closet ring (closet flange) shall be approximately 7 inches (178 mm) in diameter and, where installed, shall, together with the soil pipe, present a 1-1/2 inch (38 mm) wide flange or face to receive the fixture gasket or closet seal.

Caulked-on closet rings (closet flanges) shall be not less than 1/4 of an inch (6.4 mm) thick and not less than 2 inches (51 mm) in overall depth.

Closet rings (closet flanges) shall be burned or soldered to lead bends or stubs, shall be caulked to cast-iron soil pipe, shall be solvent cemented to ABS and PVC, and shall be screwed or fastened in an approved manner to other materials.

Closet rings (closet flanges) shall be appropriately joined as described for each specific material in accordance with Section 705.0, burned or soldered to lead bends or stubs, shall be caulked to cast-iron soil pipe, shall be solvent cemented to ABS and PVC, and shall be screwed or fastened in an approved manner to other materials.

Closet bends or stubs shall be cut-off to present a smooth surface even with the top of the closet ring before the rough inspection is called.

Closet rings (closet flanges) shall be adequately designed and secured to support fixtures connected thereto.

(below shown for reference only)

705.0 Joints and Connections.

SUBSTANTIATION:
The submission was intended to redirect all the ways a closet flange could be joined to the stub or riser to the Joints and Connection section.

1. Are closet flanges still “burned” or “soldered” to lead bends or stubs?
2. Compression or Elastomeric gasketed (Instant-set) closet rings would not be permitted with the existing language.
3. Because of the sentence structure, “Screwed” or “fastened” in an approved manner only applies to materials OTHER THAN Cast Iron, PVC, or ABS.
402.0 Installation.

402.6 Flanged Fixture Connections. (remaining text unchanged)

402.6.1 Closet Rings (Closet Flanges). Closet rings (closet flanges) for water closets or similar fixtures shall be of an approved type and shall be copper alloy, copper, hard lead, cast-iron, galvanized malleable iron, ABS, PVC, or other approved materials. Each such closet ring (closet flange) shall be approximately 7 inches (178 mm) in diameter and, where installed, shall, together with the soil pipe, present a 1 1/2 inch (38 mm) wide flange or face to receive the fixture gasket or closet seal.

Caulked-on closet rings (closet flanges) shall be not less than 1/4 of an inch (6.4 mm) thick and not less than 2 inches (51 mm) in overall depth.

Closet rings (closet flanges) shall be burned or soldered to lead bends or stubs, shall be caulked to cast-iron soil pipe, shall be solvent cemented to ABS and PVC, and shall be screwed or fastened in an approved manner to other materials.

Closet bends or stubs shall be cut-off to present a smooth surface even with the top of the closet ring before the rough inspection is called.

Closet rings (closet flanges) shall be adequately designed and secured to support fixtures connected thereto. Offset, eccentric, or reducing floor mounted closet flanges that create a ledge or otherwise constrict the full opening of the water closet shall not be used.

SUBSTANTIATION:
Currently the Code only addresses the use of offset, eccentric or reducing closet flanges for floor-mounted back-outlet water closets (see Section 402.6.3). Flanges for all water closets that constrict the full opening of a water closet into the sanitary waste piping create an obstruction in flow and are not compliant with the Code per Section 310.5. The proposed language reinforces the requirement that closet flanges that causes a restriction in flow, regardless of if they are floor or wall mounted, are not Code compliant.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
This language is not needed as it is already addressed in Section 310.5 (Obstruction of Flow).

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 402.6.1  Item #: 051
SUBMITTER: Shane Peters  Self  Comment #: 1

RECOMMENDATION:
Revise text

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

402.0 Installation.

402.6 Flanged Fixture Connections. (remaining text unchanged)

402.6.1 Closet Rings (Closet Flanges). Closet rings (closet flanges) for water closets or similar fixtures shall be of an approved type and shall be copper alloy, copper, hard lead, cast-iron, galvanized malleable iron, ABS, PVC, or other approved materials. Each such closet ring (closet flange) shall be approximately 7 inches (178 mm) in diameter and, where installed, shall, together with the soil pipe, present a 1-1/2 inch (38 mm) wide flange or face to receive the fixture gasket or closet seal.

Caulked-on closet rings (closet flanges) shall be not less than 1/4 of an inch (6.4 mm) thick and not less than 2 inches (51 mm) in overall depth.

Closet rings (closet flanges) shall be burned or soldered to lead bends or stubs, shall be caulked to cast-iron soil pipe, shall be solvent cemented to ABS and PVC, and shall be screwed or fastened in an approved manner to other materials.

Closet bends or stubs shall be cut-off to present a smooth surface even with the top of the closet ring before the rough inspection is called.

Closet rings (closet flanges) shall be adequately designed and secured to the mounting surface to support fixtures connected thereto.

Offset closet rings (closet flanges) free of ledges and corners that would obstruct flow shall be permitted for floor discharge water closets.

(below shown for reference only)

402.6.3 Securing Floor-Mounted, Back-Outlet Water Closet Bowls. Floor-mounted, back-outlet water closet bowls shall be set level with an angle of 90 degrees (1.57 rad) between the floor and wall at the centerline of the fixture outlet. The floor and wall shall have a flat mounting surface not less than 5 inches (127 mm) to the right and left of the fixture outlet centerline. The fixture shall be secured to the wall outlet flange or drainage connection and the floor by corrosion-resistant screws or bolts. The closet flange shall be secured to a firm base. Offset, eccentric, or reducing closet flanges shall not be permitted with these fixtures.

SUBSTANTIATION:
New 6th paragraph for the following reasons: Questions about the use of "offset closet flanges" are common and the only existing language is in Section 402.6.3 where offset flanges are prohibited for use with floor-mounted back-outlet water closet bowls. The language is often mistakenly applied to floor discharge models. The language of this new paragraph borrows from the Answers & Analysis database.
Proposals

Item #: 052
UPC 2024  Section: 402.6.3

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Revise text

402.0 Installation.

402.6 Flanged Fixture Connections. (remaining text unchanged)

402.6.3 Securing Floor-Mounted, Back-Outlet Water Closet Bowls. Floor-mounted, back-outlet water closet bowls shall be set level with an angle of 90 degrees (1.57 rad) between the floor and wall at the centerline of the fixture outlet. The floor and wall shall have a flat mounting surface not less than 5 inches (127 mm) to the right and left of the fixture outlet centerline. The fixture shall be secured to the wall outlet flange or drainage connection and the floor by corrosion-resistant screws or bolts. The closet flange shall be secured to a firm base. Offset, eccentric, or reducing closet flanges shall not be permitted with these fixtures.

Where floor-mounted, back-outlet water closets are used, the soil pipe shall be not less than 3 inches (80 mm) in diameter. Offset, eccentric, or reducing closet flanges shall not be used.

SUBSTANTIATION:
This change is an attempt to be clear and direct. Pipe size is not needed, as it is clearly stated in Table 702.1 and Table 703.2. The last sentence is moved up and modified to clarify that such offset, eccentric, or reducing closet flanges should not be permitted with the fixtures mentioned in Section 402.6.3.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 402.6.3
SUBMITTER: Shane Peters
Self

RECOMMENDATION:
Revise text

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

402.6 Flanged Fixture Connections. (remaining text unchanged)

402.6.3 Securing Floor-Mounted, Back-Outlet Water Closet Bowls. Floor-mounted, back-outlet water closet bowls shall be set level with an angle of 90 degrees (1.57 rad) between the floor and wall at the centerline of the fixture outlet. The floor and wall shall have a flat mounting surface not less than 5 inches (127 mm) to the right and left of the fixture outlet centerline. *The closet flange shall be firmly secured to the wall mounting surface.*

The fixture shall be secured to the wall outlet flange or drainage connection and the floor by corrosion-resistant screws or bolts. *The closet flange shall be secured to a firm base.* Offset, eccentric, or reducing closet flanges shall not be permitted with these fixtures.

**SUBSTANTIATION:**
The addition of the 3rd sentence is actually a relocation, and is accurately stating the securing of the closet flange for rear discharge water closets.

The deletion in the 5th (previously the 4th) sentence is because, with a rear discharge water closet, the flange is not located in the base (assuming the base mentioned is what the fixture sets on).

---

PUBLIC COMMENT 2

Code Year: 2024 UPC  Section #: 402.6.3  Item #: 052

SUBMITTER: Douglas Kirk
Self

RECOMMENDATION:
Revise text

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

402.0 Installation.

402.6 Flanged Fixture Connections. (remaining text unchanged)

402.6.3 Securing Floor-Mounted, Back-Outlet Water Closet Bowls. Floor-mounted, back-outlet water closet bowls shall be set level with an angle of 90 degrees (1.57 rad) between the floor and wall at the centerline of the fixture outlet. The floor and wall shall have a flat mounting surface not less than 5 inches (127 mm) to the right and left of the fixture outlet centerline. *The closet flange shall be firmly secured to the wall mounting surface.* Offset, eccentric, or reducing closet flanges shall not be permitted with these fixtures.

The fixture shall be secured to the wall outlet flange or drainage connection and the floor by corrosion-resistant screws or bolts. *The closet flange shall be secured to a firm base.* Offset, eccentric, or reducing closet flanges shall not be permitted with these fixtures.

**SUBSTANTIATION:**
The 3rd sentence is actually a relocation, and is accurately stating the securing of the closet flange for rear discharge water closets.

The deletion in the 5th (previously the 4th) sentence is because, with a rear discharge water closet, the flange is not located in the base (assuming the base mentioned is what the fixture sets on).

The relocation of last sentence groups all the closet flange (rings) requirements together.
PUBLIC COMMENT 3

Code Year: 2024 UPC  Section #: 402.6.3  Item #: 052
SUBMITTER: Douglas Kirk  Self  Comment #: 3

RECOMMENDATION:
Revise text

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

402.0 Installation.

402.6 Flanged Fixture Connections. (remaining text unchanged)

402.6.3 Securing Floor-Mounted, Back-Outlet Water Closet Bowls. Floor-mounted, back-outlet water closet bowls shall be set level. The floor and wall shall have an angle of 90 degrees (1.57 rad) between the floor and wall at the centerline of the fixture outlet. The floor and wall shall have a flat mounting surface not less than 5 inches (127 mm) to the right and left of the fixture outlet centerline. A closet flange shall be connected to the drainpipe inlet, located per manufacturers installation instructions, installed so the base of the flange finishes against the wall mounting surface, and be firmly secured to the wall structure. Offset, eccentric, or reducing closet flanges shall not be permitted with these fixtures.

The fixture shall be secured to the wall outlet flange or drainage connection and the floor by corrosion-resistant screws or bolts. The closet flange shall be secured to a firm base. Offset, eccentric, or reducing closet flanges shall not be permitted with these fixtures.

SUBSTANTIATION:
The first sentence is divided because there are different requirements under consideration.

The second sentence is reformatted and simplifies the language for the requirement.

The fourth sentence is actually a relocation and expansion, accurately stating the location and securing of the closet flange for rear discharge water closets.

The section is separated into a new paragraph as it has a different subject, regarding that of attaching the fixture to the flange and floor.

The deletion of the sentence “The closet flange shall be secured to a firm base.” is because, the flange is not located in the base of rear discharge water closet, (assuming the base mentioned is what the fixture sets on).
Proposals

Item #: 054
UPC 2024  Section: 404.2 – 404.2.2

SUBMITTER: David Mann
CA State Pipe Trades Council

RECOMMENDATION:
Revise text

404.0 Waste Fittings and Overflows.

404.2 Overflows. Where a fixture is provided with an overflow, the overflow shall comply with Section 404.2.1 and Section 404.2.2.

404.2.1 Sinks and Bathtubs. The waste shall be so arranged that the standing water in the fixture shall not rise in the overflow where the stopper is closed or remain in the overflow where the fixture is empty. The overflow pipe from a fixture shall be connected to the house or inlet side of the fixture trap, except that overflow on flush tanks shall be permitted to discharge into the water closets or urinals served by them, but it shall be unlawful to connect such overflows with any other part of the drainage system.

404.2.2 Water Closets and Urinals. Overflows on flush tanks shall be permitted to discharge into the water closets or urinals served by them.

SUBSTANTIATION:
This section is mixing overflows between sinks, water closets, urinals, and bathtubs all within the same section. However, there are different types of overflows for these sets of fixtures. The language separates the types of overflows and relocates the appropriate provision for each. This will clean up the language and add clarity to the intent.

COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC

Amend proposal as follows:

404.0 Waste Fittings and Overflows.

404.2 Overflows. Where a fixture is provided with an overflow, the overflow shall comply with Section 404.2.1 and Section 404.2.2.

404.2.1 Sinks, Lavatories, and Bathtubs. The waste shall be so arranged that the standing water in the fixture shall not rise in the overflow where the stopper is closed or remain in the overflow where the fixture is empty. The overflow pipe from a fixture shall be connected to the house or inlet side of the fixture trap. It shall be unlawful to connect such overflows with any other part of the drainage system.

404.2.2 Water Closets and Urinals. Overflows on flush tanks shall be permitted to discharge into the water closets or urinals served by them.

COMMITTEE STATEMENT:
The existing language in Section 404.2 stating “shall be unlawful to connect such overflows with any other part of the drainage system” is outdated, overly stringent, and may create confusion regarding application to water closets, and is therefore being deleted. There are overflow and drains that are now part of the same assemblies. Additionally, the term "lavatories" is being added to Section 404.2.1 as lavatories usually have an overflow.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 404.2  Item #: 054

SUBMITTER: Adam Segura
Self

RECOMMENDATION:
Revise text

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

404.0 Waste Fittings and Overflows.

404.2 Overflows. Where a fixture is provided with an overflow, the overflow shall comply with Section 404.2.1 and or Section 404.2.2.

404.2.1 Sinks, Lavatories, and Bathtubs. The waste shall be so arranged that the standing water in the fixture shall not rise in the overflow where the stopper is closed or remain in the overflow where the fixture is empty. The overflow pipe from a fixture shall be connected to the house or inlet side of the fixture trap.

404.2.2 Water Closets and Urinals. Overflows on flush tanks shall be permitted to discharge into the water closets or urinals served by them.

SUBSTANTIATION:
The requirement for overflows to comply with Section 404.2.1 and 404.2.2 would not be possible to meet since one section is for Sinks, Lavatories and Bathtubs and the other section covers Water Closets and Urinals. The text should be changed to “...the overflow shall comply with Section 404.2.1 or Section 404.2.2.”
Proposals

Item #: 056
UPC 2024  Section: 407.7

SUBMITTER: Julius Ballanco, P.E. (JB Engineering and Code Consulting, P.C.; Bradley Corp); Jim Kendzel (ASA)

RECOMMENDATION: Add new text

407.0 Lavatories.

407.7 Soap Dispenser. Each public lavatory shall have an accompanying soap dispenser.

SUBSTANTIATION: The COVID-19 pandemic has identified the importance of washing one’s hand with soap. It is interesting that the code does not require soap dispensers for public lavatories. However, most engineers and architects specify soap dispensers. Plumbing contractors install soap dispensers when located in a countertop lavatory. This is an important health issue that the Plumbing Code must address.

Bibliography:
https://www.cdc.gov/handwashing/when-how-handwashing.html

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT: The language is overly restrictive. This should be addressed by the local jurisdiction. Additionally, the proposed language requires “each public lavatory” to have a soap dispenser which is unnecessary as there may be shared dispensers.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 18  NEGATIVE: 6  ABSTAIN: 1  NOT RETURNED: 1  Daniels

EXPLANATION OF AFFIRMATIVE:

BONETTI, RIBBS: Overly restrictive, the concept is good but needs refinement.

GORSUCH: This proposal has good intentions, however, is not necessarily able to achieve its intent. Facilities change soaps/detergents all the time, very often the soap dispensers originally installed become obsolete after several years, then they occupy precious space, and sitting there allows pathogens to grow. Unless the industry can regulate soap dispensers and detergents, so they can be interchangeable with different detergents refills. Furthermore, it is the building owner/ facility’s responsibility to maintain soap dispensers; otherwise, empty soap dispensers will not help maintain public health either.

MANN: This is overly restrictive and should stay rejected.

NORRIS: I agree with the comments from Matt Sigler and Ramiro Mata.
EXPLANATION OF NEGATIVE:

**BROWN**: Agree with Matt Sigler.

**CUDAHY**: The proposal should include “wall or sink mounted,” and it may be changed out when the building enters service, but in general, a mounted soap dispenser is a good inclusion.

**FEEHAN**: This language is necessary in the code.

**MATA**: The original proposal is overly restrictive but could have been amended to require soap dispensers and allow design professionals to determine the required number of soap dispensers according to the estimated use.

**SIGLER**: The TC was correct that the current language was overly restrictive as a single soap dispenser can be utilized by two public lavatories. However, a simple modification of the proposed change could have taken care of this issue. The TC was incorrect that the installation of soap dispensers should be left up to the AHJ as it is quite common for designers who use the UPC to specify the installation of soap dispensers. Furthermore, the main purpose of the UPC is to provide minimum requirements for safeguarding public health and safety. Installing a soap dispenser to help prevent the spread of disease is definitely such a requirement.

**WHITE**: It is within the scope of the code to promote sanitary practices; perhaps an amendment could be made to allow adjoining lavatories to share a dispenser, but the committee was wrong to reject this.

EXPLANATION OF ABSTAIN:

**BALLANCO**: I am abstaining because I submitted the change on behalf of a client. I was receptive to the modification offered by Matt Sigler.

Appended Comments

**PUBLIC COMMENT 1**

**Code Year**: 2024 UPC  **Section #:** 407.7  
**RECOMMENDATION:**  
Add new text

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

**407.0 Lavatories.**

**407.7 Soap Dispenser.** Each public lavatory shall have access to a soap dispenser.

**SUBSTANTIATION:**

As originally submitted, the intent of this change was to not require a one-to-one lavatory-to-soap dispenser. It was to require access to a soap dispenser, hence the concept of an accompanying soap dispenser. By modifying the text to “access to a” soap dispenser, it clarifies that a single soap dispenser can serve more than one lavatory.
Proposals

Item #: 059
UPC 2024 Section: 408.3.2

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Revise text

408.0 Showers.

408.3 Individual Shower and Tub-Shower Combination Control Valves. (remaining text unchanged)

408.3.2 Temperature Limiting. The maximum water temperature discharging from an individual showerhead shall be limited to 120°F (49°C) by one of the following methods:
(1) A shower or tub/shower combination valve conforming to ASSE 1016/ASME A112.1016/CSA B125.16 where either:
   (a) The valve is field-adjusted to the required maximum temperature, or
   (b) The handle position, stop, or temperature limiting control is set in accordance with the manufacturer's instructions to the required maximum temperature.
(2) For gang showers supplied by a single water supply pipe, a mixing valve that conforms to ASSE 1069 that is field-adjusted to the required maximum temperature.
(3) A limiting device conforming to either ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3.
(4) A water heater conforming to ASSE 1084.
(5) A temperature actuated flow reduction device conforming to ASSE 1062

SUBSTANTIATION:
ASSE 1070, ASSE 1084 and ASSE 1062 are not designed for this application of individual showers.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 408.3.2 Item #: 059
SUBMITTER: Julius Ballanco, P.E.
JB Engineering and Code Consulting, P.C.
Rep. Self

RECOMMENDATION:
Revise text

Request to reject the code change proposal by this public comment.
SUBSTANTIATION:
The substantiation is incorrect. It appears that the proponent thinks this section addresses the compensating shower valve requirement, which it does not. Section 408.3 requires the shower valve to comply with ASSE 1016 or ASME A112.18.1/CSA B125.1 (which requires compliance with ASSE 1016). This section is only addressing the upper temperature limit of water discharging from a compensating shower valve. All of the methods listed that are being shown stricken are acceptable means of regulating the maximum shower temperature. All three standards limit the maximum temperature of hot water to 120 degree F, exactly what this section requires. Again, these are not shower valve requirements, just maximum water temperature requirements.

PUBLIC COMMENT 2
Code Year: 2024 UPC  Section #: 408.3.2 Item #: 059
SUBMITTER: Karan Kapila Self
Comment #: 2
RECOMMENDATION:
Revise text
Request to accept the code change proposal as modified by this public comment.

408.0 Showers.

408.3 Individual Shower and Tub-Shower Combination Control Valves. (remaining text unchanged)

408.3.2 Temperature Limiting. The maximum water temperature discharging from an individual showerhead shall be limited to 120°F (49°C). Water heater thermostats shall not be considered a suitable control for meeting this provision. The water temperature shall be limited by one of the following methods:
(1) A shower or tub/shower combination valve conforming to ASSE 1016/ASME A112.1016/CSA B125.16 where either:
   (a) The valve is field-adjusted to the required maximum temperature, or
   (b) The handle position, stop, or temperature limiting control is set in accordance with the manufacturer's instructions to the required maximum temperature.
(2) For gang showers supplied by a single water supply pipe, a mixing valve that conforms to ASSE 1069 that is field-adjusted to the required maximum temperature.

SUBSTANTIATION:
During the 2018 Code cycle, the Technical Committee permitted the sentence “Water heater thermostats shall not be considered a suitable control for meeting this provision.” To be stricken as new water heater standards were introduced that were capable of maintaining and controlling the outlet water temperature. However, the 2021 UPC proposal struck out those standards (ASSE 1070, ASSE 1084 and ASSE 1062) since they were not applicable for this application of individual showers.

In order to maintain the level of safety the original text intended, the sentence regarding the water heater thermostats needs to be added.
Proposals

Item #: 063
UPC 2024  Section: 408.4

SUBMITTER: Kevin Ernst
OS&B

RECOMMENDATION:
Revise text

408.0 Showers.

408.4 Waste Outlet. Showers shall have a waste outlet and fixture tailpiece not less than 2 inches (50 mm) in diameter. Fixture tailpieces shall be constructed from the materials specified in Section 701.2 for drainage piping. Strainers serving shower drains shall have a waterway at least equivalent to the area of the tailpiece.

(below shown for reference only)

404.0 Waste Fittings and Overflows.
404.1 Waste Fittings. Waste fittings shall comply with ASME A112.18.2/CSA B125.2, ASTM F409 or Table 701.2 for aboveground drainage piping and fittings.

SUBSTANTIATION:
Current wording is design restrictive. The shower drain must comply to the requirements of ASME A112.18.2/CSA B125.2 - 2020 as per Section 404.1. Within this standard there is a flow performance test in Sections 5.8.1 - 5.8.2. As long as the shower drain is certified to the standard and meets the required flow rate, there isn't a need to be prescriptive with the grate sizing.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The provided substantiation is insufficient to justify the change being proposed. In addition, the requirement being stricken needs to be included in the code so the installer has access to necessary provisions and guidance.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 18  NEGATIVE: 7  NOT RETURNED: 1  Daniels

EXPLANATION OF AFFIRMATIVE:

BONETTI: The size and design of the strainer need to remain.

MANN: I agree with the comment by Ramiro Mata. Furthermore, the sentence should be stricken as it is confusing.

NORRIS: I agree with the comment from Ramiro Mata.

RIBBS: I agree with the TC action to reject the proposal. The last sentence is needed to ensure proper drainage of the shower compartment.

EXPLANATION OF NEGATIVE:

BALLANCO: The change was properly substantiated and should have been approved as submitted.

BROWN, GORSUCH, WHITE: I agree with Ramiro Mata.
FEEHAN: The last sentence is not necessary because of Section 404.1.

MATA: The proponent has provided adequate technical justification using flow rate requirements stipulated in CSA B125.2/ASME A112.18.2.

SIGLER: I agree with Ramiro Mata. ASME A112.18.2/CSA B125.2 addresses shower drain requirements, which is referenced in Section 404.1. Therefore, the last sentence in Section 408.4 should be deleted.

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 408.4 Item #: 063

SUBMITTER: Kevin Ernst OS&B Comment #: 1

RECOMMENDATION: Delete text without substitution

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

SUBSTANTIATION:
Current wording is design restrictive. The shower drain must comply to the requirements of ASME A112.18.2/CSA B125.2 - 2020 as per Section 404.1. Within this standard there is a flow performance test in Sections 5.8.1 - 5.8.2. As long as the shower drain is certified to the standard and meets the required flow rate, there isn't a need to be prescriptive with the grate sizing.

PUBLIC COMMENT 2

Code Year: 2024 UPC Section #: 408.5 Item #: 063

SUBMITTER: Karan Kapila Self Comment #: 2

RECOMMENDATION: Revise text

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

408.0 Showers.

408.5 Waste Outlet. Showers shall have a waste outlet and fixture tailpiece not less than 2 inches (50 mm) in diameter. Fixture tailpieces shall be constructed from the materials specified in Section 701.2 for drainage piping. Strainers serving shower drains shall comply with ASME A112.18.2/CSA B125.2, have a waterway at least equivalent to the area of the tailpiece.

Note: ASME A112.18.2/CSA B125.2 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
The current UPC language in Section 408.5 (Waste Outlet) conflicts with ASME A112.18.2/CSA B125.2 regarding strainers as only “linear shower drains” are required to have the equivalent waterway as currently shown. A linear shower drain is defined in the standard as: Linear shower drain — a receptacle containing a trench- or channel-shaped body and a solid cover or grate that is flush with the adjoining surface for receiving wastewater from a shower and conveying it to the drainage system.
Not all shower drains are “linear shower drains.” Additionally, all shower drains must be in accordance to the Sections 5.8.1 - 5.8.2 (Minimum Flow Rates – Performance Requirements) of ASME A112.18.2/CSA B125.2. These sections of the standard cover all the grates/strainers. A simple modification pointing the end user to the appropriate standard will fix the conflict.
Item #: 074

UPC 2024 Section: 411.3

SUBMITTER: Bruce A Pfeiffer  
Retired - City of Topeka

RECOMMENDATION:  
Revise text

411.0 Water Closets.

411.3 Water Closet Seats. Water closet seats shall be properly sized for the water closet bowl type, and shall be of smooth, non-absorbent material. Seats, for public use, shall be of the elongated type and either of the open front type or have an automatic seat cover dispenser. Plastic seats with or without covers shall comply with IAPMO Z124.5.

SUBSTANTIATION:  
The proposed change is to concede with the reference standard as it addresses toilet seat covers as part of the standard and therefore, it is needed for clarity.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:  
The language is not needed as the standard already states that it addresses water closets with or without seat covers.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 411.3

SUBMITTER: Cambria McLeod  
Kohler

RECOMMENDATION:  
Revise text

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

411.0 Water Closets.

411.3 Water Closet Seats. Water closet seats shall be properly sized for the water closet bowl type, and shall be of smooth, non-absorbent material. Seats, for public use, shall be of the elongated type and either of the open front type or have an automatic seat cover dispenser. Water closet seats shall be provided with or without covers. Plastic seats shall comply with IAPMO Z124.5.
SUBSTANTIATION:
Clarity is needed in the field as there often is confusion as to whether a toilet seat is permitted to have a cover (lid), especially in public spaces. Whether for aesthetics, back support, health concerns regarding plume, or any other reason the user sees fit, the code should provide more clarity that covers are an allowable option in both public and private use spaces.

PUBLIC COMMENT 2
Code Year: 2024 UPC   Section #: 411.3   Item #: 074
SUBMITTER: Douglas Kirk   Comment #: 2
Self
RECOMMENDATION:
Revise text
Request to replace the code change proposal by this public comment.

411.0 Water Closets.

411.3 Water Closet Seats. Water closet seats shall be properly sized for the water closet bowl type, may be with or without a cover and shall be of smooth, non-absorbent material. Seats, for public use, shall be of the elongated type and either of the open front type or have an automatic seat cover dispenser. Plastic seats shall comply with IAPMO Z124.5.

SUBSTANTIATION:
The submission is intended to answer the frequently asked question of "does a water closet seat require a cover?" While the subject is covered for plastic seats in IAPMO Z124.5 few installers and fewer property owners have access to that standard.
Proposals

Item #: 076
UPC 2024  Section: 412.1.1

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

412.0 Urinals.

412.1 Application. (remaining text unchanged)

412.1.1 Nonwater Urinals. Nonwater urinals shall have a liquid barrier sealant to maintain a trap seal. Nonwater urinals shall permit the uninhibited flow of waste through the urinal to the sanitary drainage system. Nonwater urinals shall be cleaned and maintained in accordance with the manufacturer’s instructions after installation. Where nonwater urinals are installed, not less than one water supplied fixture rated at not less than 1 water supply fixture unit (WSFU) shall be installed upstream on the same drain line to facilitate drain line flow and rinsing. Where nonwater urinals are installed, they shall have a water distribution line rough-in to each individual urinal location to allow for the installation of an approved backflow prevention device in the event of a retrofit.

SUBSTANTIATION:
Many of the new non-water type urinals include integral mechanical devices in their cartridges for the purpose of odor control. The urinals and cartridges must be tested and must meet applicable standards, including tests for adequate flow through the devices. They do not however meet the requirements of the Code because they may cause a small reduction in flow. Removing this sentence would allow manufacturers the ability to explore the use of designs that could possibly reduce or eliminate the odors associated with these products. These odor control devices are not intended to take the place of the required liquid barrier seal and one is still required on all non-water urinals as prescribed by Code.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The language being stricken is required for health and safety. There are also concerns that the flow may become restricted and cause backups.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024 UPC  Section #: 405.2  Item #: 076
SUBMITTER: Phillip H Ribbs
PHR Consultants  Comment #: 1
RECOMMENDATION:
Revise text

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

405.0 Prohibited Fixtures.
405.1 Prohibited Water Closets. Water closets having an invisible seal or an unventilated space or having walls which are not thoroughly washed at each discharge shall be prohibited. A water closet that might permit siphonage of the contents of the bowl back into the tank shall be prohibited.

405.2 Prohibited Urinals. Trough urinals and urinals with an invisible seal shall be prohibited.

SUBSTANTIATION:
The language regarding “invisible” seal has been in a code for as long as I can remember and is antiquated. The language is not needed as it only causes confusion and Section 412.0 (Urinals) already addresses what standards urinals shall comply with.
**Proposals**

**Item #: 079**

UPC 2024  Section: 414.1, Table 1701.1

**SUBMITTER:** Joel Rigler  
Self

**RECOMMENDATION:**  
Revise text

414.0 Dishwashing Machines.

414.1 Application. Domestic dishwashing machines shall comply with NSF 184 and UL 749. Commercial dishwashing machines shall comply with NSF 3 and UL 921.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF/ANSI 184-2019</td>
<td>Residential Dishwashers</td>
<td>Appliance</td>
<td>414.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**Note:** NSF/ANSI 184 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

**SUBSTANTIATION:**  
NSF 184 is a standard for residential dishwashers. NSF 184 is very similar to NSF 3 regarding strict sanitary requirements, but for residential dishwashers. This standard helps confirm that a residential dishwasher can achieve a minimum 99.999 percent or 5-log reduction of bacteria when operated on the sanitizing cycle. In addition to confirming the unit’s ability to sanitize dishes and cookware, NSF/ANSI 184 also establishes minimum design and performance requirements related to cleaning effectiveness. This standard will be in addition to the UL 749 standard which covers the domestic dishwasher’s electrical components.

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**  
This requirement is overly stringent as the NSF 184 standard contains requirements for sanitation cycles which are not included on all dishwashing machines.

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:**  
AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

**Appended Comments**
414.0 Dishwashing Machines.

414.1 Application. Domestic dishwashing machines shall comply with UL 749. Domestic dishwashing machines containing sanitation features shall comply with NSF/ANSI 184 and UL 749.

Commercial dishwashing machines shall comply with NSF/ANSI 3 and UL 921. Commercial dishwashing machines containing sanitation features shall comply with NSF/ANSI 3 and UL 921.

TABLE 1701.1
REFERRED STANDARDS

<table>
<thead>
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</table>

(portions of table not shown remain unchanged)

Note: NSF/ANSI 3, NSF/ANSI 184, UL 749, and UL 921 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
As written, the reference to NSF 3 is overly stringent by requiring all commercial dishwashing machines to conform to NSF 3. Commercial dishwashers listed to NSF 3 pass strict sanitary requirements for commercial dishwashers to achieve a minimum 99.999 percent or 5-log reduction of bacteria when operated on the sanitizing cycle.

In addition to confirming the unit’s ability to sanitize dishes and cookware, NSF/ANSI 184 also establishes minimum design and performance requirements related to cleaning effectiveness. This standard will be in addition to the UL 749 standard which covers the domestic dishwasher’s electrical components.
Proposals

Item #: 085
UPC 2024  Section: 417.2 – 417.4, 603.5.19 – 603.5.21

SUBMITTER: Bruce A Pfeiffer  
Retired - City of Topeka

RECOMMENDATION:
Revise text

603.0 Cross-Connection Control.

603.5 Specific Requirements. Specific requirements for backflow prevention shall comply with Section 603.5.1 through Section 603.5.24.

417.2-603.5.19 Deck Mounted Bath/Shower Valves. Deck mounted bath/shower transfer valves with integral backflow protection shall comply with ASME A112.18.1/CSA B125.1. This shall include handheld showers, and other bathing appliances mounted on the deck of bathtubs or other bathing appliances that incorporate a hose or pull out feature.

417.3-603.5.20 Handheld Showers. Handheld showers shall comply with ASME A112.18.1/CSA B125.1. Handheld showers with integral backflow protection shall comply with ASME A112.18.1/CSA B125.1 or shall have a backflow prevention device that complies with ASME A112.18.3 or ASSE 1014.

417.4-603.5.21 Faucets and Fixture Fittings with Hose Connected Outlets. Faucets and fixture fittings with pull out spouts shall comply with ASME A112.18.1/CSA B125.1. Faucets and fixture fittings with pull out spouts with integral backflow protection shall comply with ASME A112.18.1/CSA B125.1 or shall have a backflow preventer device that complies with ASME A112.18.3.

603.5.19-603.5.22 Plumbing Fixture Fittings. (remaining text unchanged)
603.5.20-603.5.23 Swimming Pools, Spas, and Hot Tubs. (remaining text unchanged)
603.5.21-603.5.24 Chemical Dispensers. (remaining text unchanged)

SUBSTANTIATION:
Section 417.2, Section 417.3 and Section 417.4 deal specifically with backflow protection for deck mounted bath/shower valves, handheld showers and faucets, and fixture fittings with hose connected outlets. Requirements for backflow protection of fixtures and appliances are found in Chapter 6 making it the logical chapter to relocate these sections.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as not all requirements of the sections being relocated are specific to fixtures and should stay in Chapter 4. The sections have more than backflow requirements that are necessary in Chapter 4. The change is not necessary as the provisions should remain in Chapter 4 where users will look for fixture requirements.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments
603.0 Cross-Connection Control.

603.5 Specific Requirements. (remaining text unchanged)

603.5.19 Garbage Can Washers. Where garbage can washers are connected to a potable water supply system, the connection shall be protected against backflow by an air gap, reduced pressure principle backflow preventor, or a backflow preventer in accordance with Table 603.2.

(renumber remaining sections)

SUBSTANTIATION:
This public comment intends to address a specific cross-connection control that is silent in the code.

There are many companies that provide the service of washing garbage cans. Many are mobile units that have an independent water holding tank to supply the washer system. These types typically are not a concern for backflow since they are usually filled via an air gap. The units that sit on the floor on-site raise a different concern as there are times where they simply connect to a hose and run the system without protection. This section is important to address to protect the potable water system from contamination.
Proposals

Item #: 087

UPC 2024  Section: 417.6

SUBMITTER: Jason M Shank
   ASSE International

RECOMMENDATION:
   Revise text

417.0 Faucets and Fixture Fittings.

417.6 Low-Pressure Water Dispenser. Beverage faucets shall comply with ASME A112.18.1/CSA B125.1. Low-pressure water dispensers that dispense electrically heated water have a reservoir vented to the atmosphere shall comply with ASSE 1023. Electric devices that heat water shall comply with UL 499.

417.6 Water Dispensers. All potable water dispensers directly connected to the plumbing system shall comply with one of the following:
   (1) Beverage faucets shall comply with ASME A112.18.1/CSA B125.1.
   (2) Dispensers that supply electrically heated or cooled water shall comply with ASSE 1023.
   (3) Electric devices that heat water shall comply with UL 499.
   (4) Dispensers that include water treatment shall comply with ASSE 1023 and Section 611.0 based on the type of water treatment technology.

   (below shown for reference only)

611.0 Drinking Water Treatment Units.

Note: ASME A112.18.1/CSA B125.1, ASSE 1023, and UL 499 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
   ASSE 1023 has been updated with a change of the scope of the standard. This proposed change reflects these changes. Other referenced standards with in this section have remained but listed in an easier to read order.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
   The text is not currently written correctly regarding “one of the following” as some of the standards need to be used together. Additionally, the text will prohibit beverage dispensing machines from being used in bars.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

EXPLANATION OF AFFIRMATIVE:

GORSUCH: The intent is good. The language needs to be further refined.
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 417.6  Item #: 087
SUBMITTER: Jason M Shank  ASSE International  Comment #: 1

RECOMMENDATION:
Revise text

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

417.0 Faucets and Fixture Fittings.

417.6 Low-Pressure Water Dispenser. Beverage faucets shall comply with ASME A112.18.1/CSA B125.1. Low-pressure water dispensers that dispense electrically heated water and have a reservoir vented to the atmosphere shall comply with ASSE 1023. Electric devices that heat water shall comply with UL 499. All electrically heated or cooled potable water dispensers directly connected to the plumbing system shall comply with ASSE 1023.

SUBSTANTIATION:
The original proposal left out other types of dispensers. The new proposal leaves the old requirements in while also including the new language involving the ASSE 1023.
Proposals

Item #: 088
UPC 2024  Section: 417.7

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Add new text

417.0 Faucets and Fixture Fittings.

417.7 Head Shampoo Sink Faucets. Head shampoo sink faucets shall be supplied with hot water that is limited to not more than 120°F (49°C). Each faucet shall have integral check valves to prevent crossover flow between the hot and cold water supply connections. The means for regulating the maximum temperature shall be in accordance with one of the following:
(1) A limiting device conforming to ASSE 1070/ASME A112.1070/CSA B125.70.
(2) A water heater conforming to ASSE 1084.
(3) A temperature-actuated, flow-reduction device conforming to ASSE 1062.

Note: ASSE 1070/ASME A112.1070/CSA B125.70, ASSE 1062, and ASSE 1084 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
Currently the UPC does not address these types of faucet usage. These provisions will address the proper standards required for the health and safety of the public.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
This is overly restrictive as it will require hot water to all shampoo sinks.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 19  NEGATIVE: 6  NOT RETURNED: 1  Daniels

EXPLANATION OF NEGATIVE:

BROWN, GORSUCH: Agree with Matt Sigler

CUDAHY: Nobody wants a cold shower.

FEEHAN: This language and information are necessary in the code.

SIGLER: Section 601.2.1 requires plumbing fixtures that are installed for private and public use to be provided with hot water for bathing and washing purposes. Therefore, how can it be "overly restrictive" (in accordance with the Committee's statement) to require a head shampoo sink faucet to be provided with hot water when the code already mandates such a practice?

WHITE: Agree with Matt Sigler that these devices should be utilized to maintain safe temperatures to shampoo sinks.
**Appended Comments**

**PUBLIC COMMENT 1**  
Code Year: 2024 UPC Section #: 417.7  
Item #: 088  
SUBMITTER: Jason M Shank  
ASSE International  
Comment #: 1  

RECOMMENDATION:  
Add new text  
Request to accept the code change proposal as submitted by this public comment.

SUBSTANTIATION:  
The committee rejected the proposal stating that the proposal would now require the installation of hot water. Section 601.2.1 requires plumbing fixtures that are installed for private and public use to be provided with hot water for bathing and washing purposes, which would include a shampoo sink. The proposed language will now provide direction on how to protect the user.

(below shown for reference only)

**601.2.1 Hot and Cold Water Required.** In occupancies where plumbing fixtures are installed for private use, hot water shall be required for bathing, washing, laundry, cooking purposes, dishwashing or maintenance. In occupancies where plumbing fixtures are installed for public use, hot water shall be required for bathing and washing purposes. This requirement shall not supersede the requirements for individual temperature control limitations for public lavatories and public and private bidets, bathtubs, whirlpool bathtubs, and shower control valves.
Proposals

Item #: 089
UPC 2024  Section: 417.8

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Add new text

417.0 Faucets and Fixture Fittings.

417.8 Footbaths and Pedicure Baths. The water supplied to specialty plumbing fixtures, such as pedicure chairs having an integral foot bathtub and footbaths, shall be limited to not more than 120°F (49°C) by a water-temperature-limiting device that conforms to ASSE 1070/ASME A112.1070/CSA B125.70 or by a water heater complying with ASSE 1084.

Note: ASSE 1070/ASME A112.1070/CSA B125.70 and ASSE 1084 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
Currently the UPC does not address these types of faucet usage. These provisions will address the proper standards required for the health and safety of the public.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The language is overly restrictive and would require all pedicure sinks to contain hot water.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 19  NEGATIVE: 6  NOT RETURNED: 1  Daniels

EXPLANATION OF NEGATIVE:

BROWN, GORSUCH: Agree with Matt Sigler

CUDAHY: Nobody wants a cold footbath.

FEEHAN: This language and information are necessary in the code.

SIGLER: Section 601.2.1 requires plumbing fixtures that are installed for private and public use to be provided with hot water for bathing and washing purposes. Therefore, how can it be "overly restrictive" (in accordance with the committee's statement) to require a footbath and pedicure bath to be provided with hot water when the code already mandates such a practice?

WHITE: Agree with Matt Sigler, these devices should be utilized to maintain safety for the user.

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

SUBSTANTIATION:
The committee rejected the proposal stating that the proposal would now require the installation of hot water. Section 601.2.1 requires plumbing fixtures that are installed for private and public use to be provided with hot water for bathing and washing purposes, which would include footbaths and pedicure baths. The proposed language will now provide direction on how to protect the user.

(below shown for reference only)

**601.2.1 Hot and Cold Water Required.** In occupancies where plumbing fixtures are installed for private use, hot water shall be required for bathing, washing, laundry, cooking purposes, dishwashing or maintenance. In occupancies where plumbing fixtures are installed for public use, hot water shall be required for bathing and washing purposes. This requirement shall not supersede the requirements for individual temperature control limitations for public lavatories and public and private bidets, bathtubs, whirlpool bathtubs, and shower control valves.
Proposals

Item #: 092
UPC 2024  Section: Table 422.1

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>TABLE 422.1</th>
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<tbody>
<tr>
<td>MINIMUM PLUMBING FACILITIES¹</td>
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<tr>
<td>LAVATORIES (FIXTURES PER PERSON)⁵</td>
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</table>

(portions of table not shown remain unchanged)

Notes:
1 The figures shown are based upon one fixture being the minimum required for the number of persons indicated or any fraction thereof.
2 A restaurant is defined as a business that sells food to be consumed on the premises.
   a. The number of occupants for a drive-in restaurant shall be considered as equal to the number of parking stalls.
   b. Hand-washing facilities shall be available in the kitchen for employees.
3 The total number of required water closets for females shall be not less than the total number of required water closets and urinals for males.
4 For each urinal added in excess of the minimum required, one water closet shall be permitted to be deducted. The number of water closets shall not be reduced to less than two-thirds of the minimum requirement.
5 Metering or self-closing faucets shall be installed on lavatories intended to serve the transient public.
6 Service sinks shall not be required for non-residential occupancies with an occupant load of 15 or less.
7 For business and mercantile occupancies, one common service sink shall be permitted when accessible to all businesses and mercantile within 300 feet and within the same story.

SUBSTANTIATION:
Note 6 is being added to remove the conflict with the building code and UPC regarding required service sinks. Note 7 is being added for flexibility as the language will allow businesses and mercantile occupancies to share a common service sink within the same work/business area. Similarly, with common facilities from Section 422.4, the UPC requires access to be within 300 feet on the same floor, it makes sense for the distance to be limited to the same.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments
PUBLIC COMMENT 1

Item #: 092

SUBMITTER: Douglas Kirk
Self

RECOMMENDATION:
Revise text

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

209.0 – G –
Gray Water. Untreated wastewater that has not come into contact with toilet waste, kitchen sink waste, dishwasher waste or similarly contaminated sources. Gray water includes wastewater from bathtubs, showers, lavatories, clothes washers, and laundry sinks. Also, known as grey water, graywater, and greywater.

405.3 Miscellaneous Fixtures. Fixed wooden, or tile wash trays or sinks for domestic use shall not be installed in a building designed or used for human habitation. No sheet metal-lined wooden bathtub shall be installed or reconnected. No dry or chemical closet (toilet) shall be installed in a building used for human habitation unless first approved by the Health Officer.

420.2 Water Consumption. Sink faucets shall have a maximum flow rate of not more than 2.2 gpm at 60 psi (8.3 L/mat 414 kPa).
Exceptions:
(1) Clinical sinks
(2) Laundry sinks trays
(3) Service sinks

TABLE 611.4
SIZING OF RESIDENTIAL WATER SOFTENERS

(portions of the table remain unchanged)

1 Installation of a kitchen sink and dishwasher, laundry sink-tray, and automatic clothes washer permitted without additional size increase.
2-4 (remaining text unchanged)

1001.2 Where Required. Each plumbing fixture shall be separately trapped by an approved type of liquid seal trap. This section shall not apply to fixtures with integral traps. Not more than one trap shall be permitted on a trap arm. Food waste disposers installed with a set of restaurant, commercial, or industrial sinks shall be connected to a separate trap.
Each domestic clothes washer and each laundry sink shall be connected to a separate and independent trap, except that a trap serving a laundry sink shall also be permitted to receive the waste from a clothes washer set adjacent to it. The vertical distance between a fixture outlet and the trap weir shall be as short as practicable, but in no case shall the tailpiece exceed 24 inches (610 mm) in length.
One trap shall be permitted to serve a set of not more than three single compartment sinks or laundry sinks of the same depth or three lavatories immediately adjacent to each other and in the same room where the waste outlets are not more than 30 inches (762 mm) apart, and the trap is centrally located where three compartments are installed.

1003.1 General Requirements. Each trap, except for traps within an interceptor or similar device shall be self-cleaning. Traps for bathtubs, showers, lavatories, sinks, laundry sinks, floor drains, urinals, drinking fountains, dental units, and similar fixtures shall be of standard design, weight and shall be of ABS, cast-brass, cast-iron, lead, PP, PVC, or other approved material. An exposed and readily accessible drain copper alloy tubing trap, not less than 17 B & S Gauge (0.045 inch) (1.143 mm), shall be permitted to be used on fixtures discharging domestic sewage.

Index — W —
WOODEN SINKS AND TILE WASH TRAYS OR SINKS

Index — L —
LAUNDRY SINKS TUBS

L 201.0 Definitions.
Kitchen and Bar Sink Faucets. A faucet that discharges into a kitchen or bar sinks in domestic or commercial installations. Supply fittings that discharge into other type sinks, including clinical sinks, floor sinks, service sinks and laundry sinks are not included.
### TABLE 422.1
MINIMUM PLUMBING FACILITIES

<table>
<thead>
<tr>
<th>TYPE OF OCCUPANCY2</th>
<th>WATER CLOSETS (FIXTURES PER PERSON)3</th>
<th>URINALS (FIXTURES PER PERSON)4</th>
<th>LAVATORIES (FIXTURES PER PERSON)5</th>
<th>BATHTUBS OR SHOWERS (FIXTURES PER PERSON)</th>
<th>DRINKING FOUNTAINS/ FACILITIES (FIXTURES PER PERSON)</th>
<th>OTHER6, 7</th>
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<tbody>
<tr>
<td>A-1 Assembly occupancy (fixed or permanent seating)- theaters, concert halls, and auditoriums</td>
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<td>A-2 Assembly occupancy- restaurants, pubs, lounges, nightclubs and banquet halls</td>
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<td>A-3 Assembly occupancy (typical without fixed or permanent seating)- arcades, places of worship, museums, libraries, lecture halls, gymnasiaums (without spectator seating), indoor pools (without spectator seating)</td>
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<td>A-4 Assembly occupancy (indoor activities or sporting events with spectator seating)- swimming pools, skating rinks, arenas, and gymnasiaums</td>
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### TABLE 422.1 (continued)

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<th>TYPE OF OCCUPANCY2</th>
<th>WATER CLOSETS (FIXTURES PER PERSON)3</th>
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<th>OTHER6, 7</th>
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<tbody>
<tr>
<td>A-5 Assembly occupancy (outdoor activities or sporting events)- amusement parks, grandstands and stadiums</td>
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<td>4-101-200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-201-300</td>
<td>6-201-300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-301-400</td>
<td>8-301-400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 400, add 1 fixture for</td>
<td>Over 600,</td>
<td>Over 750, add 1 fixture for</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 750,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of Occupancy</td>
<td>Water Closets (Fixtures per Person)</td>
<td>Urinals (Fixtures per Person)</td>
<td>Lavatories (Fixtures per Person)</td>
<td>Bathtubs or Showers (Fixtures per Person)</td>
<td>Drinking Fountains/Facilities (Fixtures per Person)</td>
<td>Other</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------</td>
<td>-------------------------------</td>
<td>----------------------------------</td>
<td>---------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>I-2 Institutional occupancy</strong>&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitals and nursing homes - individual rooms and ward room</td>
<td>1 per room</td>
<td>—</td>
<td>1 per room</td>
<td>1 per room</td>
<td>1 per 150</td>
<td>1 service sink or laundry tray sink</td>
</tr>
<tr>
<td>1 per 8 patients</td>
<td>—</td>
<td>1 per 10 patients</td>
<td>1 per 20 patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital Waiting or Visitor Rooms</td>
<td>1 per room</td>
<td>—</td>
<td>1 per room</td>
<td>—</td>
<td>1 per room</td>
<td>—</td>
</tr>
<tr>
<td><strong>Employee Use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male: 1-15</td>
<td></td>
<td>Female: 1-15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2: 16-35</td>
<td>3: 36-55</td>
<td>4: 36-55</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 55, add 1 fixture for each additional 40 persons.</td>
<td>—</td>
<td>Male 1 per 40</td>
<td>Female 1 per 40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>I-3 Institutional occupancy</strong>&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prisons</td>
<td>1 per cell</td>
<td>—</td>
<td>1 per cell</td>
<td>1 per 20</td>
<td>1 per cell block/floor</td>
<td>—</td>
</tr>
<tr>
<td>Correctional facilities or juvenile center</td>
<td>1 per 8</td>
<td>—</td>
<td>1 per 10</td>
<td>1 per 8</td>
<td>1 per floor</td>
<td>1 service sink or laundry tray sink</td>
</tr>
<tr>
<td>Employee Use</td>
<td>Male: 1-15</td>
<td>Female: 1-15</td>
<td>Male 1 per 40</td>
<td>Female 1 per 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TYPE OF OCCUPANCY1</td>
<td>WATER CLOSETS (FIXTURES PER PERSON)2</td>
<td>URINALS (FIXTURES PER PERSON)3</td>
<td>LAVATORIES (FIXTURES PER PERSON)4</td>
<td>BATHTUBS OR SHOWERS (FIXTURES PER PERSON)5</td>
<td>DRINKING FOUNTAINS/ FACILITIES (FIXTURES PER PERSON)6</td>
<td>OTHER6, 7</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------</td>
<td>--------------------------------</td>
<td>-----------------------------------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td><strong>I-4 Institutional occupancy (any age that receives care for less than 24 hours)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 55, add 1 fixture for each additional 40 persons.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male: 1-15</td>
<td>Female: 1-15</td>
<td>Male: 1-16-35</td>
<td>Female: 1-16-35</td>
<td>—</td>
<td>Female 1 per 40</td>
<td>—</td>
</tr>
<tr>
<td>Over 55, add 1 fixture for each additional 40 persons.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>M Mercantile occupancy (the sale of merchandise and accessible to the public)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 400, add 1 fixture for each additional 500 males and 1 fixture for each 200 females.</td>
<td></td>
<td>Over 400, add 1 fixture for each additional 500 males and 1 fixture for each 400 females.</td>
<td>Over 750, add 1 fixture for each additional 500 persons.</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>R-1 Residential occupancy (minimal stay)- hotels, motels, bed and breakfast homes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 per sleeping room</td>
<td>—</td>
<td>1 per sleeping room</td>
<td>—</td>
<td>—</td>
<td>1 per sleeping room</td>
<td>—</td>
</tr>
<tr>
<td><strong>R-2 Residential occupancy (long-term or permanent)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dormitories</td>
<td>Male 1 per 10</td>
<td>Female 1 per 8</td>
<td>Male 1 per 25</td>
<td>Female 1 per 12</td>
<td>Over 150, add 1 fixture for each additional 20 males and 1 fixture for each additional 50 females.</td>
<td>Add 1 fixture for each additional 20 males and 1 fixture for each additional 15 females.</td>
</tr>
<tr>
<td>Over 55, add 1 fixture for each additional 40 persons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apartment house/unit</td>
<td>1 per apartment</td>
<td>—</td>
<td>1 per apartment</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>R-3 Residential occupancy (long-term or permanent in nature) for more than 5 but does not exceed 16 occupants)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male 1 per 10</td>
<td>Female 1 per 8</td>
<td>Male 1 per 12</td>
<td>Female 1 per 12</td>
<td>Add 1 fixture for each additional 20 males and 1 fixture for each additional 15 females.</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>R-3 Residential occupancy (one and two family dwellings)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 per one and two family dwelling</td>
<td>—</td>
<td>1 per one and two family dwelling</td>
<td>1 per one and two family</td>
<td>—</td>
<td>—</td>
<td>1 kitchen sink and 1</td>
</tr>
</tbody>
</table>
### TABLE 422.1

**MINIMUM PLUMBING FACILITIES**

<table>
<thead>
<tr>
<th>TYPE OF OCCUPANCY</th>
<th>WATER CLOSETS (FIXTURES PER PERSON)</th>
<th>URINALS (FIXTURES PER PERSON)</th>
<th>LAVATORIES (FIXTURES PER PERSON)</th>
<th>BATHTUBS OR SHOWERS (FIXTURES PER PERSON)</th>
<th>DRINKING FOUNTAINS/FACILITIES (FIXTURES PER PERSON)</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-4 Residential occupancy (residential care or assisted living)</td>
<td>Male 1 per 10 Female 1 per 8</td>
<td>Add 1 fixture for each additional 25 males and 1 fixture for each additional 20 females.</td>
<td></td>
<td></td>
<td></td>
<td>1 per 8 1 per 150</td>
</tr>
<tr>
<td></td>
<td>Male 1 per 12 Female 1 per 12</td>
<td>Add 1 fixture for each additional 20 males and 1 fixture for each additional 15 females.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 service sink or laundry tray</td>
</tr>
</tbody>
</table>

**Notes:**
1 - 7 (remaining text unchanged)

**SUBSTANTIATION:**
In 1997 “Laundry Tubs” and “Laundry Trays” became “Laundry Sinks” when using the 1997 version of the UPC. Gradually the term Laundry Tray or Tub have been replaced but the terms still remain in the above sections of the code. This change is submitted to complete the change to Laundry Sinks so the language is consistent.

[Supporting documentation provided in KAVI for TC review]
Proposals

Item #: 093
UPC 2024  Section: 422.2

SUBMITTER: Julius Ballanco, P.E.
   JB Engineering and Code Consulting, P.C.
   Rep. Self

RECOMMENDATION:
Revise text

422.0 Minimum Number of Required Fixtures.
422.2 Separate Facilities. Separate toilet facilities shall be provided for each sex.

Exceptions:
(1) Residential installations.
(2) In occupancies with a total occupant load of 10 or less, including customers and employees, one toilet facility, designed for use by no more than one person at a time, shall be permitted for use by both sexes.
(3) In business and mercantile occupancies with a total occupant load of 50 or less including customers and employees, one toilet facility, designed for use by no more than one person at a time, shall be permitted for use by both sexes.
(4) Separate facilities shall not be required where rooms have fixtures designed for use by both sexes and the water closets are installed in privacy compartments. Urinals shall be located in an area that is visually separated from the remainder of the room or each urinal shall be installed in a privacy compartment.

SUBSTANTIATION:
The Building Code added an allowance for all gender toilet rooms in the 2021 edition. This change provides a correlation with the Building Code. All gender toilet rooms have become common place in other countries. The water closets and urinals are located in privacy compartments while the lavatories are located in the open. There is no issue with waiting time since everyone has access to all the fixtures. All gender toilet rooms also avoid any discrimination regarding gender identity. This concept is gaining popularity in North America. Since the Building Code allows such a design, the Uniform Plumbing Code should have a similar requirement. Otherwise, the code are in conflict.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed text is already addressed in the building code. Furthermore, there is concern as to who will enforce such requirements.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 24  ABSTAIN: 1  NOT RETURNED: 1  Daniels

EXPLANATION OF AFFIRMATIVE:
BARBATO: I agree with the first sentence, however, the second sentence is overly restrictive.

EXPLANATION OF ABSTAIN:
BALLANCO: As the proponent of this change, I am abstaining to avoid any perceived conflict of interest.

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 422.2  Item #: 093

SUBMITTER: Julius Ballanco (JB Engineering and Code Consulting, P.C., Rep. Self); Eric Driever (American Institute of Architects - AIA); Rona Rothenberg (American Institute of Architects – AIA California)

RECOMMENDATION:

Revise text

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

SUBSTANTIATION:

Julius Ballanco: The reason provided for rejecting this change is that it is already in the Building Code. While that is a correct statement, at the current time, the Plumbing Code conflicts with the Building Code. While the Building Code allows all gender toilet room, Section 422.2 specifically prohibits all gender toilet rooms. By accepting the proposed text, the Plumbing Code would be consistent with the Building Code.

The second reason for rejecting the change questions who would enforce the requirements. With this requirement included in the Plumbing Code, the AHJ would have no problem enforcing the requirements. It is the responsibility of the AHJ to determine division of code enforcement within their own department. The enforcement of this requirement would most likely vary between jurisdictions.

Since many departments assign these requirements to be enforced by the building plans examiner, one could question including these provisions in the Plumbing Code. However, this statement would apply to all of Section 422.0. Thus, the remedy would be to delete all of Section 422. I DO NOT believe that to be appropriate. In my opinion these are plumbing code requirements that the Building Code can adopt. However, the requirements should always originate in the Plumbing Code and be controlled by the Plumbing Technical Committee.

Eric Driever:

I am writing to you to provide comment in my capacity as Principal Architect for Architectural Codes and Policies Team for DSA Headquarters. DSA, in part, promulgates portions of the California Building code. We are also the enforcement agency over building standards for California Schools and Community Colleges. In short, DSA supports the proposal for Item number :093 originally submitted by Julius Ballanco, P.E., relating to Section 422.2 Separate Facilities.

Our reasoning is as follows: The current as well as our recently adopted edition of the California Plumbing Code, which uses the Uniform Plumbing Code (UPC) as its model code, does not permit all gender multi-user facilities and requires an enforcement entity to use the “alternate means and methods of construction equivalency” process to permit use, which includes submitting such a request in writing to the enforcement entity for each application. The International Plumbing Code (IPC), which California does not use as its model code, includes the exception that permits such facilities. The International Building Code (IBC), which California does use as its model code has Chapter 29 Plumbing Systems, a chapter that California does not adopt. Chapter 29 also contains the allowance through a similar exception, but because California does not adopt this Chapter of the IBC, it cannot use this language to permit the use of multiuser all gender facilities, and therefore, must use the “alternate means and methods” process and documentation to meet compliance.

If this language is adopted in the UPC (through IAPMO), California will be able to permit an owner’s or designer’s design for all gender multi-user facilities without having to require the “alternate means and methods” process. In the initial proposal, IAPMO rejected the inclusion of the language because they stated that the IBC (by way of Chapter 29) already provides an enforcement mechanism to permit use of all gender multi-user facilities; however, as outlined above, in California this is not the case. Exclusion of this language creates an exclusionary provision in the code for which DSA must enforce. Inclusion of the language would provide a streamlined process to permit all gender facilities a practice that is growing in regularity and is inclusionary. Without the proposed language the UPC places undue burden not just on DSA, but all agencies required to adopt and enforce the California Plumbing Code to review individual alternate means and methods requests.

We appreciate your attention to this matter and look forward to the possibility of expanding the UPC provisions to allow for all-gender facilities.
Rona Rothenberg:
On behalf of the American Institute of Architects (AIA) California, an association of nearly 11,000 architects in California, I write to support the proposed change to UPC Chapter 422.2 Separate Facilities.

Specifically, we support the proposed paragraph (4) of Section 422.2:
(4) Separate facilities shall not be required where rooms have fixtures designed for use by both sexes and the water closets are installed in privacy compartments. Urinals shall be located in an area that is visually separated from the remainder of the room or each urinal shall be installed in a privacy compartment.

This proposed change is important to California as we do not adopt Chapter 29 of the International Building Code, in which the language in paragraph 4 appears. As a result, the absence of this language in the UPC makes it unnecessarily difficult to permit all gender multi-user restroom facilities. Thank you for considering our support for this important change to UPC Chapter 422.2.
Proposals

Item #: 094
UPC 2024  Section: 422.2

SUBMITTER: Bruce A Pfeiffer  Retired - City of Topeka

RECOMMENDATION:
Add new text

422.0 Minimum Number of Required Fixtures.

422.2 Multiple Occupancy Buildings. Buildings having multiple types of occupancies, shall have separate toilet facilities for each occupancy with the minimum number of fixtures prescribed in Table 422.1. A common set of restrooms shall be permitted to be used to accommodate all of the building occupants when the following requirements are met:

(1) Restrooms shall be accessible to the occupants at all times.
(2) The maximum travel distance from the restrooms to any occupancy shall not exceed 300 feet (91 440 mm).
(3) The total occupant load for the building shall be determined by adding the individual occupant loads together. The minimum number of fixtures for the common restrooms shall be calculated at 50 percent female and 50 percent male based on the total occupant load and by using the occupancy requiring the greatest number of fixtures per occupant load in accordance with Table 422.1.

(renumber remaining sections)

SUBSTANTIATION:
The renovation of older buildings to accommodate multiple types of occupancies has prompted design professionals to request guidance on how to calculate the minimum fixtures required. This section will provide the guidelines for those types of occupancies.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed change is confusing as to what amount of fixtures would be required for each occupancy type. No justification was provided for the 300 foot requirement.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024  UPC  Section #: 422.1, 422.1.1, 422.2  Item #: 094
SUBMITTER: Adam Segura  Self  Comment #: 1
RECOMMENDATION:
Revise text

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

422.0 Minimum Number of Required Fixtures.

422.1 Fixture Count. Plumbing fixtures shall be provided for the type of building occupancy and in the minimum number shown in Table 422.1. The total occupant load and occupancy classification shall be determined in accordance with the building code. Occupancy classification not shown in Table 422.1 shall be considered separately by the Authority Having Jurisdiction.

422.1.1 Fixture Calculations. The minimum number of fixtures shall be calculated at 50 percent male and 50 percent female based on the total occupant load. Where information submitted indicates a difference in the distribution of the sexes such information shall be used to determine the number of fixtures for each sex. Once the occupancy load and occupancy are determined, Table 422.1 shall be applied to determine the minimum number of plumbing fixtures required. Where applying the fixture ratios in Table 422.1 results in fractional numbers, such numbers shall be rounded to the next whole number. For gender neutral bathrooms, the minimum number of fixtures shall be the aggregate calculated at 50 percent female and 50 percent male in accordance with Table 422.1. Where gender neutral fixtures are provided in addition to separate men’s and women’s facilities, those gender neutral fixtures shall be included in determining the number of fixtures provided in an occupancy.

(renumber remaining sections)

422.2 Separate Facilities. Separate toilet facilities shall be provided for each sex.

Exceptions:
(1) Residential installations.
(2) In occupancies with a total occupant load of 10 or less, including customers and employees, one toilet facility, designed for use by no more than one person at a time, shall be permitted for use by both sexes.
(3) In business and mercantile occupancies with a total occupant load of 50 or less including customers and employees, one toilet facility, designed for use by no more than one person at a time, shall be permitted for use by both sexes.
(4) For gender neutral bathrooms, separate facilities shall not be required for each gender where in accordance with Section 422.1.

SUBSTANTIATION:
The original proposal attempts to clarify calculating the total fixture count from a given occupant load. Section 422.1 has been divided into two paragraphs to separate topics and will make it easier for the end user to find and use the provisions associated with occupant load and fixture count/calculations. The added language to Section 422.1.1 (Fixture Calculations) clarifies that the number of fixtures is the sum of the male and female toilet facility fixtures as calculated in Table 422.1.

Note four was added to Section 422.2 (Separate Facilities) to show that, where permitted, single use facilities used by either sex with are those described in Section 422.1.1. The text clarifies that each single use facility will take the place of a set of a male and a female facility.

PUBLIC COMMENT 2

Code Year: 2024 UPC Section #: 422.1.1, 422.2.1 Item #: 094
SUBMITTER: Phillip H Ribbs PHR Consultants Comment #: 2

RECOMMENDATION:
Revise text

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

422.1.1 Single Use, Family or Assisted-Use Toilet, and Bathing Facilities. Where single use, family or assisted-use toilet, and bathing rooms are required, in applicable building regulations, the facilities shall be installed in accordance with those regulations. Fixtures located in single use, family or assisted-use, and bathing room facilities shall contribute to the total number of required fixtures in accordance with Section 422.1.
422.2.1 Single Use Toilet Facilities. Single use toilet facilities, bathing facilities, and family or assisted use toilet facilities shall be identified with signage indicating use by either sex.

SUBSTANTIATION:
Text was added to Section 422.1 to add clarity that facilities which are designated to be used by all genders are taken into account for the total amount of fixtures required. This is a common question, and the new language will assist the end users.

Additionally, Section 422.2.1 is being updated to add bathing facilities as it is considered a facility intended for all genders. The title is also being updated as single use is more than just for toilet facilities.
Proposals

Item #: 097

UPC 2024  Section: 422.6 – 422.6.3

SUBMITTER: Julius Ballanco, P.E.
JB Engineering and Code Consulting, P.C.
Rep. Adult Changing Table Committee of ICC A117.1

RECOMMENDATION:
Add new text

422.0 Minimum Number of Required Fixtures.

422.6 Adult Changing Station. Where adult changing stations are provided, they shall be located in accordance with one of the following:
(1) The adult changing station shall be installed in a single-user toilet room or bathroom.
(2) The adult changing station shall be installed in a family or assisted-use toilet room or bathroom.
(3) The adult changing station shall be installed in a toilet room or bathroom with multiple water closet compartments. The adult changing station shall be provided with privacy by a curtain or wall or be installed within a privacy compartment. Where separate facilities are provided for each sex, the adult changing station shall be installed in both toilet rooms or bathrooms.
(4) The adult changing station shall be installed in a separate room.

422.6.1 Lavatory Location. Where an adult changing station is installed in a privacy compartment or separate room, a lavatory shall be provided within that space. The lavatory shall comply with the accessibility requirement of ICC A117.1.

Exception: In a separate room, an alcohol-based hand sanitizer dispenser shall be permitted in lieu of a lavatory.

422.6.2 Waste Receptacle. An approved self-closing waste receptacle shall be provided in the toilet room or bathing room. Where an adult changing station is installed in a privacy compartment, the waste receptacle shall be located within the compartment. The waste receptacle shall be a leak-resistant design with a minimum capacity of 2.8 gallons (10.6 L).

422.6.3 Floor Drain Required. A floor drain shall be installed in toilet rooms and bathing rooms having an adult changing station.

Note: ICC A117.1 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
The Adult Changing Table Committee of ICC A117.1 developed this code change to address the installation of adult changing stations that are installed on a voluntary basis. There is no mandate within this code change. A companion code change was proposed to Chapter 11 of the ICC International Building Code that would mandate adult changing stations in certain buildings.

If an adult changing station is installed, this code change provides the requirements for public access, cleanliness, and sanitation. The access to an adult changing station is outlined in the first section which lists the rooms in which an adult changing station can be installed. The first two options are obvious in that they would be installed in an individual toilet or bathing room. The third option would allow the changing station to be installed in a men's or ladies room or all gender toilet room having multiple fixtures. Privacy requirements are specified to allow the adult diaper changing to take place out of public view. The fourth option would be a separate room similar to a lactating room in a commercial building or nurses’ station in a school.
Every toilet or bathing room has a lavatory. The new requirement would stipulate that when an adult changing station is installed in a privacy compartment or separate room a lavatory would be required for that room to allow for cleanup during and after diaper changing. If there is a separate room without plumbing located in the close proximity, an alcohol-based hand sanitizer dispenser could be used as a substitute for a lavatory.

Since the adult changing station involves the changing of adult diapers, a waste receptacle is required to dispose of the diaper. To minimize the odor from the diaper, the waste receptacle is required to be self-closing. While the Committee considered mandating ventilation for the waste receptacle, it was decided to at a minimum require self-closing.

A floor drain is also required to facilitate the washing of the area in the event of an accident during the diaper changing operation. While floor drains are common in toilet rooms and bathing rooms, the Uniform Plumbing Code does not mandate the fixture for all toilet rooms or bathrooms. This section would result in mandating the floor drain when an adult changing station is installed.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as it is better suited in the building code. There are hygiene and sanitation concerns about the exception to allow alcohol-based hand sanitizers in lieu of a lavatory for hand washing.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 24  ABSTAIN: 1  NOT RETURNED: 1  Daniels

EXPLANATION OF ABSTAIN:

BALLANCO: As the proponent of this change, I am abstaining. Since this change was submitted, the Adult Changing Table Committee has proposed to remove the requirements for waste receptacles and floor drains. A Public Comment will be forthcoming.

APPENDED COMMENTS

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 422.6 – 422.6.1  Item #: 097

SUBMITTER: Julius Ballanco  Comment #: 1

JB Engineering and Code Consulting, P.C.
Rep. Adult Changing Table Committee of ICC A117.1

RECOMMENDATION:
Revise text

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

422.0 Minimum Number of Required Fixtures.

422.6 Adult Changing Station. Where adult changing stations are provided for public use, they shall be located in accordance with one of the following:
(1) The adult changing station shall be installed in a single-user toilet room or bathroom.
(2) The adult changing station shall be installed in a family or assisted-use toilet room or bathroom.
(3) The adult changing station shall be installed in a toilet room or bathroom with multiple water closet compartments. The adult changing station shall be provided with privacy by a curtain or wall or be installed within a privacy compartment. Where separate facilities are provided for each sex, the adult changing station shall be installed in both toilet rooms or bathrooms.
(4) The adult changing station shall be installed in a separate room.

422.6.1 Lavatory Location. Where an adult changing station is installed in a privacy compartment or separate room, a lavatory shall be provided within that space. The lavatory shall comply with the accessibility requirement of ICC A117.1.
Exception: Where an adult changing station is installed in a separate room in an existing building, an alcohol-based hand sanitizer dispenser shall be permitted in lieu of a lavatory.

Note: ICC A117.1 meets the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
This public comment includes modification made by the Adult Changing Station Working Group. The requirement for waste receptacle (422.6.2 Waste Receptacle) and floor drains (422.6.3 Floor Drain Required) have been removed and are not included in the modification. The Working Group saw no need for mandating such requirements. The other modification is to address the public use adult changing station. In schools there may be adult changing stations in special education classroom areas. These adult changing stations are under the supervised control of the educators.

The final modification is to the exception. The only allowance considered for substituting alcohol-based hand sanitizer dispensers is for existing buildings where a lavatory and plumbing may not be available.

The Technical Committee thought that these requirements belong in the Building Code. However, the Building Code only regulates when an adult changing station is required. This change addresses all public use adult changing stations whether required or not. It is similar to the Building Code mandating the requirement for plumbing fixtures, however, the plumbing code regulates all of the requirements including certain room requirements for plumbing fixture whether mandated or not.
422.0 Minimum Number of Required Fixtures.

422.6 Water Closet Compartment. Public water closets shall occupy a separate compartment with walls or partitions and a door enclosing the fixtures to ensure privacy. Partitions for water closets shall comply with the Type B security requirements of IAPMO Z124.XX.

Exceptions:
(1) Water closet compartments shall not be required in a single-occupant toilet room having a lockable door.
(2) Toilet rooms in day care facilities having more than one water closets shall be permitted to have one water closet without an enclosing compartment.

422.7 Urinal Partitions. Each urinal shall be separated with walls or partitions to provide privacy. The horizontal dimension between walls or partitions at each urinal shall comply with Section 402.5. Partitions for urinals shall comply with the Type C security requirements of IAPMO Z124.XX. Walls or partitions shall extend from not less than 12 inches (305 mm) above the finished floor to not less than 60 inches (1524 mm) above the finished floor. Walls shall extend outward from the wall surface not less than 18 inches (457 mm).

Exception: Urinal partitions shall not be required in a single occupant or family/assisted-use toilet room with a lockable door.

TABLE 1701.1

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO Z124.XX</td>
<td>Plastic Water Closet and Urinal</td>
<td>Miscellaneous</td>
<td>422.6, 422.7</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO Z124.XX is a working draft and is not completed at the time of this monograph.

SUBSTANTIATION:
This code change addresses the requirements for privacy partitions for water closets and urinals. Privacy for the user of water closets and urinals is a very important issue. The Plumbing Code regulates all aspects of proper use of plumbing fixtures. Included in the proper use is maintaining an environment that provides a person privacy to prevent paruresis or parcopresis.

The change specifies the level of privacy assured the user of water closets and urinals. The new standard being developed, IAPMO Z124.XX identifies privacy requirements for water closets and urinals. There are three levels of privacy identified in the draft of the standard, Type A, Type B, and Type C. Type A privacy requires partitions to prevent visual observation as well as security of the user. The current draft lists the partitions starting at 4 inches above the floor and extending to a height of 7 feet. The door must be the full height of the partition with both sides of the door sealed to prevent any visual observation. The draft requires the doors to be lockable from the inside with visual notification on the outside that the compartment is in use.
Type B privacy is equivalent to the common water closet partition that is used in men’s and ladies’ rooms. The doors to the partitions will allow a standard 1/2 inch gap.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The standard was not completed at the time of this monograph. Furthermore, partitions should be addressed by the building code.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 24   ABSTAIN: 1   NOT RETURNED: 1   Daniels

EXPLANATION OF AFFIRMATIVE:

SIGLER: I am okay with the proposed change not being approved because the standard was not finalized in time for the public hearings. However, I disagree that partitions should only be addressed in the building code as the UPC, in Section 402.5 (Setting), provides spacing requirements between plumbing fixtures and partitions, and Appendix E (Recreational Vehicle Parks) provides requirements for water closet partitions.

EXPLANATION OF ABSTAIN:

BALLANCO: I submitted this code change on behalf of a client. The standard has since been assigned the number Z124.10.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 422.6, 422.7, Table 1701.1

SUBMITTER: Julius Ballanco
JB Engineering and Code Consulting, P.C.

RECOMMENDATION:
Add new text

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

422.0 Minimum Number of Required Fixtures.

422.6 Water Closet Compartment. Public water closets shall occupy a separate compartment with walls or partitions and a door enclosing the fixtures to ensure privacy. Partitions for water closets shall comply with the Type B security requirements of IAPMO Z124.10.

Exceptions:
(1) Water closet compartments shall not be required in a single-occupant toilet room having a lockable door.
(2) Toilet rooms in day care facilities having more than one water closets shall be permitted to have one water closet without an enclosing compartment.

422.7 Urinal Partitions. Each urinal shall be separated with walls or partitions to provide privacy. The horizontal dimension between walls or partitions at each urinal shall comply with Section 402.5. Partitions for urinals shall comply with the Type C security requirements of IAPMO Z124.10. Walls or partitions shall extend from not less than 12 inches (305 mm) above the finished floor to not less than 60 inches (1524 mm) above the finished floor. Walls shall extend outward from the wall surface not less than 18 inches (457 mm).

Exception: Urinal partitions shall not be required in a single occupant or family/assisted-use toilet room with a lockable door.
TABLE 1701.1
REFERENCED STANDARDS

<table>
<thead>
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<tbody>
<tr>
<td>IAPMO Z124.10-202X</td>
<td>Water Closet and Urinal Partitions</td>
<td>Miscellaneous</td>
<td>422.6, 422.7</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO Z124.10 is a working draft and is not completed at the time of this monograph.

SUBSTANTIATION:
The standard number has been added as a modification since it was unknown at the time of the original submittal. The standard should be finalized by the May Technical Committee meeting.

The committee statement indicated that the partition requirements should be in the Building Code. Using this logic, the fixture table, Table 422.1, should be in the Building Code, not the Plumbing Code. I disagree since the use of plumbing fixtures, including privacy, is a plumbing issue not a building code issue.

I would note that the ICC International Building Code include Chapter 29 on Plumbing Systems. Within that Chapter is the plumbing fixture table. Also included are partition requirements. The reason the plumbing fixture table was added to the Building Code is because architects determine the number of plumbing fixtures for most buildings, not the plumbing engineer nor the plumbing contractor. However, while the table appears in the Building Code, it is the identical table in the ICC International Plumbing Code.

When reviewing the International Building Code, almost every section in Chapter 29 has a [P] before the section number. This [P] indicates that the section is regulated by the Plumbing Code Change Committee not one of the various Building Code Change Committees. Thus, the Building Code recognizes that partitions must be decided by the plumbing professionals. For that reason, the Plumbing Code and the Plumbing Technical Committee need to regulate partitions.

Paruresis and parcopresis are real issues that need to be addressed in the Plumbing Code. The guarantee of privacy is the means of combating these issues. In addition to paruresis and parcopresis, there is a need to assure security for all gender toilet rooms. This has been a particular concern expressed by the female and transgender population.

The new IAPMO standard on partitions addressed paruresis, parcopresis, and security. There are three levels of partitions. Two partition types are what the industry classically calls standard partitions. These are the partitions currently used for water closet is separate gender toilet rooms and around urinals in men’s room. The third new category in IAPMO Z124.10, identified as Type A, provide added privacy and security for all gender toilet rooms.

PUBLIC COMMENT 2

Code Year: 2024 UPC  Section #: 422.6, 422.7, Table 1701.1  Item #: 098
RECOMMENDATION:
Add new text
Request to replace the code change proposal by this public comment.

422.0 Minimum Number of Required Fixtures.

422.6 Water Closet Compartment. Public water closets shall occupy a separate compartment with walls or partitions and a door enclosing the fixtures to ensure privacy. Partitions for water closets located in separate gender toilet or bathrooms shall comply with the Type B security requirements of IAPMO Z124.10. Partitions for water closets located in all gender toilet or bathrooms shall comply with the Type A security requirements of IAPMO Z124.10.

Exceptions:
(1) Water closet compartments shall not be required in a single-occupant toilet room having a lockable door.
(2) Toilet rooms in day care facilities having more than one water closets shall be permitted to have one water closet without an enclosing compartment.

**422.7 Urinal Partitions.** Each urinal shall be separated with walls or partitions to provide privacy. The horizontal dimension between walls or partitions at each urinal shall comply with Section 402.5. Partitions for urinals shall comply with the Type C security requirements of IAPMO Z124.10. Walls or partitions shall extend from not less than 12 inches (305 mm) above the finished floor to not less than 60 inches (1524 mm) above the finished floor. Walls shall extend outward from the wall surface not less than 18 inches (457 mm). Urinals located in all gender toilet rooms shall be visually separated from the remainder of the room or each urinal shall be installed in a privacy compartment complying with Type A security requirements of IAPMO Z124.10.

**Exception:** Urinal partitions shall not be required in a single occupant or family/assisted-use toilet room with a lockable door.

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(portions of table not shown remain unchanged)

**Note:** IAPMO Z124.10 is a working draft and is not completed at the time of this monograph.

**SUBSTANTIATION:**
If Item #093 is approved, there needs to be requirements for privacy and security in all gender toilet rooms. This modification would add the Type A security requirements for partitions installed in all gender toilet rooms.

See the justification for the addition of IAPMO Z124.10 in the other public comment to this item.
CHAPTER 5
WATER HEATERS

504.3.2 Unlisted Water Heaters. Unlisted water heaters shall be installed with a clearance of 12 inches (305 mm) on all sides and rear. Combustible floors under unlisted water heaters shall be protected in an approved manner. [NFPA 54:10.27.2.2]

504.5 Temperature-Limiting Devices. A water heater installation or a hot water storage vessel installation shall be provided with overtemperature protection by means of an approved, listed device installed in accordance with the terms of its listing and the manufacturer’s installation instructions. [NFPA 54:10.26.5]

504.6 Temperature, Pressure, and Vacuum Relief Devices. Temperature, pressure, and vacuum relief devices or combinations thereof, and automatic gas shutoff devices shall be installed in accordance with the terms of their listings and the manufacturer’s installation instructions. A shutoff valve shall not be placed between the relief valve and the water heater or on discharge pipes between such valves and the atmosphere. The hourly British thermal units (Btu) (kW•h) discharge capacity or the rated steam relief capacity of the device shall be not less than the input rating of the water heater. [NFPA 54:10.26.6] Discharge piping shall be installed in accordance with Section 608.5.

506.1 General. Air for combustion, ventilation, and dilution of flue gases for appliances installed in buildings shall be obtained by application of one of the methods covered in Section 506.2 through Section 506.7.3. Where the requirements of Section 506.2 are not met, outdoor air shall be introduced in accordance with methods covered in Section 506.4 through Section 506.7.3.

Exception: This provision shall not apply to direct-vent appliances. [NFPA 54:9.3.1.1]

506.2.2 Known Air Infiltration Rate Method. Where the air infiltration rate of a structure is known, the minimum required volume shall be determined as follows [NFPA 54:9.3.2.2]:

(1) For appliances other than fan-assisted, calculate using the following Equation 506.2.2(1). [NFPA 54:9.3.2.2(1)]

\[
\text{Required Volume}_{\text{air}} = \frac{21 \text{ ft}^3}{\text{ACH}} \left( \frac{I_{\text{oiler}}}{1000 \text{ Btu/h}} \right)
\]

(2) For fan-assisted appliances, calculate using the following Equation 506.2.2(2). [NFPA 54:9.3.2.2(2)]

\[
\text{Required Volume}_{\text{air}} = \frac{15 \text{ ft}^3}{\text{ACH}} \left( \frac{I_{\text{fan}}}{1000 \text{ Btu/h}} \right)
\]


### Addition to Existing System

For purposes of these calculations, an infiltration rate greater than 0.60 \( \text{ACH} \) shall not be used in the equations in Section 506.2.2 and Section 506.2.2. \([\text{NFPA 54}:9.3.2.2(3)]\)

#### 506.6 Engineered Installations

Engineered combustion air installations shall provide an adequate supply of combustion, ventilation, and dilution air and shall be approved by the Authority Having Jurisdiction determined using engineering methods. \([\text{NFPA 54}:9.3.5]\)

#### 507.7 Types of Gas(es)

The appliance shall be connected to the fuel gas for which it was designed. No attempt shall be made to convert the appliance from the gas specified on the rating plate for use with a different gas without consulting the installation instructions, the serving gas supplier, or the appliance manufacturer for complete instructions. Listed appliances shall not be converted unless permitted by and in accordance with the manufacturer's installation instructions. \([\text{NFPA 54}:9.1.3]\)

#### 507.8 Safety Shutoff Devices for Unlisted LP-Gas Appliance Used Indoors

Unlisted appliances for use with undiluted liquefied petroleum gases \(\text{LP-Gases}\) and installed indoors, except attended laboratory equipment, shall be equipped with safety shutoff devices of the complete shutoff type. \([\text{NFPA 54}:9.1.4]\)

#### 507.18 Adequate Capacity of Piping—Addition to Existing System

When additional appliances are being connected to a gas piping system, the existing piping shall be checked to determine whether it has adequate capacity. Where the capacity of the system is determined to be inadequate for the additional appliance(s), the existing system shall be enlarged as necessary or a separate gas piping of adequate capacity shall be run from the point of delivery to the appliance(s). \([\text{NFPA 54}:9.1.16]\)

#### 507.19 Avoiding Strain on Gas Piping

Appliances shall be supported and connected to the piping so as not to exert undue strain on the connections. \([\text{NFPA 54}:9.1.17]\)

#### 507.20 Gas Appliance Pressure Regulators

Where the gas supply pressure is higher than that at which the appliance is designed to operate or varies beyond the design pressure limits of the appliance, a gas appliance pressure regulator listed in accordance with ANSI Z21.18/CSA 6.3 shall be installed. \([\text{NFPA 54}:9.1.18]\)

#### 507.21 Venting of Gas Appliance Pressure Regulators

Venting of gas appliance pressure regulators shall comply with the following requirements:

1. Appliance pressure regulators requiring access to the atmosphere for successful operation shall be equipped with vent piping leading outdoors or, if the regulator vent is an integral part of the appliance, into the combustion chamber adjacent to a continuous pilot, unless constructed or equipped with a vent limiting means to limit the escape of gas from the vent opening in the event of diaphragm failure.
2. Vent limiting means shall be employed on listed appliance pressure regulators only.
3. In the case of vents leading outdoors, means shall be employed to prevent water from entering this piping and also to prevent blockage of vents by insects and foreign matter.
4. Under no circumstances shall a regulator be vented to the appliance flue or exhaust system.
5. In the case of vents entering the combustion chamber, the vent shall be located so the escaping gas is readily ignited by the pilot and the heat liberated thereby does not adversely affect the normal operation of the safety shutoff system. The terminus of the vent shall be securely held in a fixed position relative to the pilot. For manufactured gas, the need for a flame arrester in the vent piping shall be determined.
6. A vent line(s) from an appliance pressure regulator and a bleed line(s) from a diaphragm-type valve shall not be connected to a common manifold terminating in a combustion chamber. Vent lines shall not terminate in positive-pressure type combustion chambers. \([\text{NFPA 54}:9.1.19]\)

(renumber remaining sections)

#### 507.22 Bleed Lines for Diaphragm-Type Valves

Bleed lines shall comply with the following requirements:

1. Diaphragm-type valves shall be equipped to convey bleed gas to the outdoors or into the combustion chamber adjacent to a continuous pilot.
2. In the case of bleed lines leading outdoors, means shall be employed to prevent water from entering this piping and also to prevent blockage of vents by insects and foreign matter.
3. Bleed lines shall not terminate in the appliance flue or exhaust system.
4. In the case of bleed lines entering the combustion chamber, the bleed line shall be located so the bleed gas is readily ignited by the pilot and the heat liberated thereby does not adversely affect the normal operation of the safety shutoff system. The terminus of the bleed line shall be securely held in a fixed position relative to the pilot. For manufactured gas, the need for a flame arrester in the bleed line piping shall be determined.
507.23 Combination of Appliances and Equipment. Any combination of appliances, equipment, attachments, or devices used together in any manner shall comply with the standards that apply to the individual appliance and equipment. [NFPA 54: 9.1.21]

507.24 Installation Instructions. The installing agency installer shall conform to the appliance and equipment manufacturer's recommendations in completing an installation. The installing agency installer shall leave the manufacturer's installation, operating, and maintenance instructions in a location on the premises where they are readily available for reference and guidance of the Authority Having Jurisdiction, service personnel, and the owner or operator. [NFPA 54: 9.1.22]

507.25 Protection of Outdoor Appliances. Appliances not listed for outdoor installation but installed outdoors shall be provided with protection to the degree that the environment requires. Appliances listed for outdoor installation shall be permitted to be installed without protection in accordance with the provisions of its listing and the manufacturer's installation instructions. [NFPA 54: 9.1.21]

508.2.2 Electrical Power. All appliances requiring an external source of electrical power for its operation shall be installed in accordance with NFPA 70, provided with the following:

1. A readily accessible electrical disconnecting means within sight of the appliance that completely de-energizes the appliance.
2. A 120 V-AC grounding-type receptacle outlet on the roof adjacent to the appliance on the supply side of the disconnect switch. [NFPA 54: 9.4.2.3]

508.4 Appliances in Attics and Under-Floor Spaces. An attic or under-floor space in which an appliance is installed shall be accessible through an opening and passageway not less than at least as large as the largest component of the appliance, and not less than 22 inches by 30 inches (559 mm by 762 mm). [NFPA 54: 9.5.1]

508.4.4 Lighting and Convenience Outlet. A permanent 120 V receptacle outlet and a lighting fixture luminaire shall be installed near the appliance. The switch controlling the lighting fixture luminaire shall be located at the entrance to the passageway. [NFPA 54: 9.5.3]

509.1.1 Installation. Listed chimneys and vents shall be installed in accordance with Section 509.0 and the manufacturer's installation instructions. [NFPA 54: 12.2.1]

509.2.6 Direct-Vent Appliances. Listed direct-vent appliances shall be installed in accordance with the manufacturer's installation instructions and Section 509.8.2. [NFPA 54: 12.3.5.1]

509.2.6.1 Through-the-Wall Vent Termination. Through-the-wall vent terminations for listed direct-vent appliances shall be in accordance with Section 509.8.1. [NFPA 54: 12.3.5.2]

509.2.7 Appliances with Integral Vents. Appliances incorporating integral venting means shall be installed in accordance with the manufacturer's installation instructions, Section 509.8 and Section 509.8.1. [NFPA 54: 12.3.6]

509.3.3.5 Exit Terminals. The exit terminals of mechanical draft systems shall be not less than 7 feet (2134 mm) above finished ground level where located adjacent to public walkways and shall be located as specified in Section 509.8 and Section 509.8.1 of this code. [NFPA 54: 12.4.3.6]

509.3.4 Ventilating Hoods and Exhaust Systems. Where automatically operated appliances, other than commercial cooking food service appliances, are vented through a ventilating hood or exhaust system equipped with a damper or with a power means of exhaust, provisions shall be made to allow the flow of gas to the main burners only when the damper is open to a position to properly vent the appliance and when the power means of exhaust is in operation. [NFPA 54: 12.4.4.1]

509.5.1 Factory-Built Chimneys. Factory-built chimneys shall be listed in accordance with UL 103, UL 959, or UL 2561. Factory-built chimneys shall be installed in accordance with the manufacturer's installation instructions. Factory-built chimneys used to vent appliances that operate at positive vent pressure shall be listed for such application. [NFPA 54: 12.6.1.1]

509.5.5 Size of Chimneys. The effective area of a chimney venting system serving listed appliances with draft hoods, Category I appliances, and other appliances listed for use with Type B vents shall be in accordance with one of the following methods:

1. Those listed in Section 510.0.
2. For sizing an individual chimney venting system for a single appliance with a draft hood, the effective areas of the
venting system is of a venting system serving a single appliance with a draft hood shall be not less than the area of the appliance flue collar or draft hood outlet or greater than seven times the draft hood outlet area.

(3) For sizing The effective area of the chimney flue of a chimney venting system connected to serving two appliances with draft hoods, the effective area of the chimney flue shall be not less than the area of the larger draft hood outlet plus 50 percent of the area of the smaller draft hood outlet or greater than seven times the smaller draft hood outlet area.

(4) Chimney venting systems using mechanical draft shall be sized in accordance with approved engineering methods.

(5) Other approved engineering methods. [NFPA 54:12.6.3.1]

509.5.6.1 Standard. Chimneys shall be lined in accordance with NFPA 211.

Exception: Existing chimneys shall be permitted to have their use continued when an appliance is replaced by an appliance of similar type, input rating, and efficiency, where the chimney complies with Section 509.5.6 through Section 509.5.6.3 and the sizing of the chimney is in accordance with Section 509.5.6. [NFPA 54:12.6.4.2]

509.5.6.2 Cleanouts. Cleanouts shall be examined and where they do not remain tightly closed when not in use, they shall be repaired or replaced. [NFPA 54:12.6.4.3]

509.6.2.1 Category I Appliances. The sizing of natural draft venting systems serving one or more listed appliances equipped with a draft hood or appliances listed for use with a Type B gas vent, installed in a single story of a building, shall be in accordance with one of the following:

(1) The provisions of Section 510.0.

(2) Vents serving fan-assisted combustion system appliances, or combinations of fan-assisted combustion system and draft hood-equipped appliances, shall be sized in accordance with Section 510.0 or other approved engineering methods.

(3) For sizing an individual gas vent for a single, draft hood-equipped appliance, the effective area of the vent connector and the gas vent shall be not less than the area of the appliance draft hood outlet or greater than seven times the draft hood outlet area.

(4) For sizing a gas vent connected to two appliances with draft hoods, the effective area of the vent shall be not less than the area of the larger draft hood outlet plus 50 percent of the area of the smaller draft hood outlet or greater than seven times the smaller draft hood outlet area.

(5) Other approved engineering practices Engineering methods. [NFPA 54:12.7.4.1]

509.6.2.3 Category II, Category III, and Category IV Appliances. The sizing of gas vents for Category II, Category III, and Category IV appliances shall be in accordance with the appliance manufacturer’s instructions. The sizing of plastic pipe specified by the appliance manufacturer as a venting material for Category II, III, and IV appliances shall be in accordance with the appliance manufacturer's instructions. [NFPA 54:12.7.4.3]

509.6.2.4 Sizing. Chimney venting systems using mechanical draft shall be sized in accordance with approved engineering methods. [NFPA 54:12.7.4.4]

509.6.3 Gas Vents Serving Appliances on More than One Floor. A Where a common vent shall be permitted is installed in a multistory installations to vent Category I appliances located on more than one floor level, provided the venting system is shall be designed and installed in accordance with approved engineering methods. For the purpose of this section, crawl spaces, basements, and attics shall be considered as floor levels. [NFPA 54:12.7.5.1]

509.7.4 Size of Single-Wall Metal Pipe. Single-wall metal piping shall comply with the following requirements:

(1) A venting system of a single-wall metal pipe shall be sized in accordance with one of the following methods and the appliance manufacturer’s instructions:

(a) For a draft hood-equipped appliance, in accordance with Section 510.0.

(b) For a venting system for a single appliance with a draft hood, the areas of the connector and the pipe each shall not be less than the area of the appliance flue collar or draft hood outlet, whichever is smaller. The vent area shall not be greater than seven times the draft hood outlet area.

(c) Other approved engineering methods.

(2) Where a single-wall metal pipe is used and has a shape other than round, it shall have an equivalent effective area equal to the effective area of the round pipe for which it is substituted and the minimum internal dimension of the pipe shall be 2 inches (50 mm).

(3) The vent cap or a roof assembly shall have a venting capacity not less than that of the pipe to which it is attached. [NFPA 54:12.8.5]

509.8 Through-the-Wall Vent Termination. Through-the-wall vent termination shall be in accordance with Section 509.8.1 through Section 509.8.3.

A mechanical draft venting system shall terminate at least 3 feet (914 mm) above any forced air inlet located within 10 feet (3048 mm) (See Figure 509.8).

Exceptions:

(1) This provision shall not apply to the combustion air intake of a direct-vent appliance.

(2) This provision shall not apply to the separation of the integral outdoor air inlet and flue gas discharge of listed
outdoor appliances. [NFPA 54:12.9.1]

509.8.1 Mechanical Draft Venting System. A mechanical draft venting system of other than direct-vent type shall terminate at least 4 feet (1219 mm) below, 4 feet (1219 mm) horizontally from, or 1 foot (305 mm) above any door, operable window, or gravity air inlet into any building. The bottom of the vent terminal shall be located at least 12 inches (305 mm) above finished ground level. [NFPA 54:12.9.2]

509.8.2 Direct-Vent Appliance.

509.8.1 Clearance for Through-the-Wall Vent Termination. The clearances for through-the-wall direct-vent and non-direct vent terminals shall be in accordance with Table 509.8.2. 509.8.1 and Figure 509.8.1. The bottom of the vent terminal and the air intake shall be located not less than 12 inches (305 mm) above finished ground level.

Exception: The clearances in Table 509.8.1 shall not apply to the combustion air intake of a direct vent appliance. [NFPA 54:12.9.3-12.9.1]

509.8.3 Category I through Category IV and Noncategorized Appliances. Through the wall vents for Category II and Category IV appliances and noncategorized condensing appliances shall not terminate over public walkways or over an area where condensate or vapor could create a nuisance or hazard or could be detrimental to the operation of regulators, relief valves, or other equipment. Where local experience indicates that condensate is a problem with Category I and Category III appliances, this provision shall also apply.

Drains for condensate shall be installed in accordance with the appliance and the vent manufacturer's installation instructions. [NFPA 54:12.9.4]

509.8.4-509.8.2 Annular Spaces. Where vents, including those for direct-vent appliances or combustion air intake pipes, penetrate outside walls of buildings, the annular spaces around such penetrations shall be permanently sealed using approved materials to prevent entry of combustion products into the building. [NFPA 54:12.9.5-12.9.2]

509.8.5 509.8.3 Vent Terminals. Vent systems for Category IV appliances that terminate through an outside wall of a building and discharge flue gases perpendicular to the adjacent wall shall be located not less than 10 feet (3048 mm) horizontally from an operable opening in an adjacent building.

Exception: This shall not apply to vent terminals that are 2 feet (610 mm) or more above or 25 feet (7620 mm) or more below operable openings. [NFPA 54:12.9.6-12.9.3]

509.9 Condensation Drain. Provision shall be made to collect and dispose of condensate from venting systems serving Category II and Category IV appliances and noncategorized condensing appliances in accordance with Section 509.8.3. [NFPA 54:12.10.1]

509.9.1 Installation Local Experience. Where local experience indicates that condensation is a problem, provision shall be made to drain off and dispose of condensate from venting systems serving Category I and Category III appliances in accordance with Section 509.8.3. Drains for condensate shall be installed in accordance with the appliance and vent manufacturers' installation instructions. [NFPA 54:12.10.2]

509.10.1.4 Medium-Heat Appliances. Vent connectors for medium-heat appliances shall be constructed of factory-built, medium-heat chimney sections or steel of a thickness not less than that specified in Table 509.10.1.4 and shall comply with the following:

1. A steel vent connector for an appliance with a vent gas temperature in excess of 1000°F (538°C) measured at the entrance to the connector shall be lined with medium-duty fire brick or the equivalent.
2. The lining shall be at least 21/2 inches (64 mm) thick for a vent connector having a diameter or greatest cross-sectional dimension of 18 inches (457 mm) or less.
3. The lining shall be at least 41/2 inches (114 mm) thick laid on the 41/2 inches (114 mm) bed for a vent connector having a diameter or greatest cross-sectional dimension greater than 18 inches (457 mm).

509.10.2 Size of Vent Connector. A vent connector for an appliance with a single draft hood or for a Category I fan-assisted combustion system appliance shall be sized and installed in accordance with Section 510.0 or other approved engineering methods. [NFPA 54:12.11.3.1]

509.10.2.1 Manifold. For a single appliance having more than one draft hood outlet or flue collar is installed, the manifold shall be constructed according to the instructions of the appliance manufacturer. Where there are no instructions, the manifold shall be designed and constructed in accordance with approved engineering methods. As an alternative method, the effective area of the manifold shall equal the combined area of the flue collars or draft hood outlets, and the vent connectors shall have a minimum 1 foot (305 mm) rise. [NFPA 54:12.11.3.2]

509.10.2.2 Size. Where two or more appliances are connected to a common vent or chimney, each vent connector shall be sized in accordance with Section 510.0 or other approved engineering methods. [NFPA 54:12.11.3.3]

As an alternative method applicable only where all of the appliances are draft hood-equipped, each vent connector shall have an effective area not less than the area of the draft hood outlet of the appliance to which it is connected. [NFPA 54:12.11.3.4]

509.10.2.3 Height. Where two or more appliances are vented through a common vent connector or vent manifold, the
common vent connector or vent manifold shall be located at the highest level consistent with available headroom and clearance to combustible material and sized in accordance with Section 510.0 or other approved engineering methods. [NFPA 54:12.11.3.5]

As an alternative method applicable only where there are two draft hood-equipped appliances, the effective area of the common vent connector or vent manifold and all junction fittings shall be not less than the area of the larger vent connector plus 50 percent of the area of the smaller flue collar outlet. [NFPA 54:12.11.3.6]

509.10.6 Connector Junctions. Where vent connectors are joined together, the connection shall be made with a manufactured tee or wye fitting. [NFPA 54:12.11.7]

(renumber remaining section)

509.10.6 Slope. A vent connector shall be installed without any dips or sags and shall slope upward toward the vent or chimney at least 1/4 inch per foot (20.8 mm/m).

Exception: Vent connectors attached to a mechanical draft system installed in accordance with appliance and the draft system manufacturer's instructions. [NFPA 42.14.7-12.11.8]

509.10.7.1 Single Wall Connector. The maximum horizontal length of a single-wall connector shall be 75 percent of the height of the chimney or vent, except for engineered systems. [NFPA 54:12.11.8.1-12.11.9.1]

509.10.7.2 Type B Double Wall Connector. The maximum horizontal length of a Type B double-wall connector shall be 100 percent of the height of the chimney or vent, except for engineered systems. The maximum length of an individual connector for a chimney or vent system serving multiple appliances, from the appliance outlet to the junction with the common vent or another connector, shall be 100 percent of the height of the chimney or vent. [NFPA 54:12.11.8.2-12.11.9.2]

509.10.8 Support. A vent connector shall be supported for the design and weight of the material employed to maintain clearances and prevent physical damage and separation of joints. [NFPA 54:12.11.9-12.11.10]

509.10.9 Chimney Connection. Where entering a flue in a masonry or metal chimney, the vent connector shall be installed above the extreme bottom to avoid stoppage. [NFPA 54:12.11.11.1] Where a thimble or slip joint is used to facilitate removal of the connector, the connector shall be firmly attached to or inserted into the thimble or slip joint to prevent the connector from falling out. [NFPA 54:12.11.11.2] Means shall be employed to prevent the connector from entering so far as to restrict the space between its end and the opposite wall of the chimney flue. [NFPA 54:12.11.11.3]

509.10.10 Inspection. The entire length of a vent connector shall be readily accessible for inspection, cleaning, and replacement. [NFPA 54:12.11.12]

509.10.11 Fireplaces. A vent connector shall not be connected to a chimney flue serving a fireplace unless the fireplace flue opening is permanently sealed. [NFPA 54:12.11.13]

509.10.12.1 Medium-Heat Appliances. Vent connectors for medium-heat appliances shall not pass through walls or partitions constructed of combustible material. [NFPA 54:12.11.14.2]

509.12 Appliances Requiring Draft Hoods and Draft Controls. Vented appliances shall be installed with draft hoods.

Exception: Dual oven-type combination ranges; incinerators; direct-vent direct vent appliances; fan-assisted combustion system appliances; appliances requiring chimney draft for operation; single-firebox boilers equipped with conversion burners with inputs exceeding greater than 400 000 Btu/h (117 kW); appliances equipped with blast, power, or pressure burners that are not listed for use with draft hoods; and appliances designed for forced venting. [NFPA 54:12.13.1]

509.12.1 Installation. A draft hood supplied with or forming a part of a listed vented appliance shall be installed without alteration, exactly as furnished and specified by the appliance manufacturer. [NFPA 54:12.13.2]

If a draft hood is not supplied by the appliance manufacturer where one is required, a draft hood shall be installed, be of a listed or approved type, and, in the absence of other instructions, be of the same size as the appliance flue collar. Where a draft hood is required with a conversion burner, it shall be of a listed or approved type. [NFPA 54:12.13.2.1]

Where a draft hood of special design is needed or preferable, the installation shall be approved and in accordance with the recommendations of the appliance manufacturer. [NFPA 54:12.13.2.2]

509.13 Manually Operated Dampers. A manually operated damper shall not be placed in any appliance vent connector. Fixed baffles and balancing baffles shall not be classified as manually operated dampers. [NFPA 54:12.14.1]

Balancing baffles shall be mechanically locked in the desired position before placing the appliance in service. [NFPA 54:12.14.2] Balancing baffles shall be listed in accordance with UL 378. [NFPA 54:12.14.3]

509.14 Automatically Operated Vent Dampers. An automatically operated vent damper shall be of a listed type. [NFPA 54:12.15]

509.15 Obstructions. Devices that retard the flow of vent gases shall not be installed in a vent connector, chimney, or vent. The following shall not be considered as obstructions:

(1) Draft regulators and safety controls specifically listed for installation in ventilating systems and installed in
accordance with the manufacturer’s installation instructions.

(2) Approved draft regulators and safety controls designed and installed in accordance with approved engineering methods.

(3) Listed heat reclaimers and automatically operated vent dampers installed in accordance with the manufacturer’s installation instructions.

(4) Vent dampers serving listed appliances installed in accordance with Section 510.1 or Section 510.2 or other approved engineering methods.

(5) Approved economizers, heat reclaimers, and recuperators installed in venting systems of appliances not required to be equipped with draft hoods, provided the appliance manufacturer’s instructions cover the installation of such a device in the venting system and performance in accordance with Section 509.3 and Section 509.3.1 is obtained. [NFPA 54:12.16]

510.1.6 Corrugated Chimney Liner Reduction. Listed corrugated metallic chimney liner systems in masonry chimneys shall be sized by using Table 510.1.2(1) or Table 510.1.2(2) for Type B vents with the maximum capacity reduced by 20 percent (0.80 x maximum capacity) and the minimum capacity as shown in Table 510.1.2(1) or Table 510.1.2(2).

Corrugated metallic liner systems installed with bends or offsets shall have their maximum capacity further reduced in accordance with Section 510.1.2. The 20 percent reduction for corrugated metallic chimney liner systems includes an allowance for one long radius 90 degree (1.57 rad) turn at the bottom of the liner. [NFPA 54:13.1.7]

510.1.8 Vertical Vent Upsizing Using the 7 x Times Rule. Where the vertical vent has a larger diameter than the vent connector, the vertical vent diameter shall be used to determine the minimum vent capacity, and the connector diameter shall be used to determine the maximum vent capacity. The flow area of the vertical vent shall not exceed seven times the flow area of the listed appliance categorized vent area, flue collar area, or draft hood outlet area unless designed in accordance with approved engineering methods. [NFPA 54:13.1.9]

510.1.13 Single Run of Vent Multiple Vertical Vent Sizes. In a single run of vent or vent connector, more than one diameter and type shall be permitted to be used, provided that all the sizes and types are permitted by the tables. [NFPA 54:13.1.14]

510.1.16 Engineering Methods Sizing Vents Not Covered by Tables. For Where a vent heights is lower than 6 feet (1829 mm) and-or higher than shown in Table 510.1.2(1) through Table 510.2(9), an engineering methods shall be used to calculate the vent capacity capacities. [NFPA 54:13.1.17]

510.2 Multiple Appliance Vent Table 510.2(1) through Table 510.2(9) Obstructions and Vent Dampers. (remaining text unchanged) [NFPA 54:13.2.1]

510.2.12 Vent Height. For The available total height (H) for multiple appliances all located on one the same floor; available total height (H) shall be measured from the highest draft hood outlet or flue collar up to the level of the outlet of the common vent. [NFPA 54:13.2.13]

510.2.13 Multistory Installations Vent Height. For multistory installations, Where appliances are located on more than one floor, the available total height (H) for each segment of the system shall be the vertical distance between the highest draft hood outlet or flue collar entering that segment and the centerline of the next higher interconnection tee. [NFPA 54:13.2.14]

510.2.15 Vent-Type Multistory Type B Vents Required Installations. (remaining text unchanged) [NFPA 54:13.2.16]

510.2.16 Offsets in Multistory Vent Offsets and Capacity Installations. (remaining text unchanged) [NFPA 54:13.2.17]

510.2.17 Vertical Vent Size Limitation. Where two or more appliances are connected to a vertical vent or chimney, the flow area of the largest section of vertical vent or chimney shall not exceed seven times the smallest listed appliance categorized vent areas, flue collar area, or draft hood outlet area unless designed in accordance with approved engineering methods. [NFPA 54:13.2.18]

510.2.18 Multiple Input Ratings. For appliances with more than one input rate, The minimum vent connector capacity (FAN Min) of appliances with more than one input rate shall be determined from the tables and shall be less than the lowest appliance input rating; and The maximum vent connector capacity (FAN Max or NAT Max) shall be determined from the tables and shall be greater than the highest appliance input rating. [NFPA 54:13.2.19]
## TABLE 509.4
**TYPE OF VENTING SYSTEM TO BE USED**
{{NFPA 54: TABLE 12.5.1}}

<table>
<thead>
<tr>
<th>APPLIANCES</th>
<th>TYPE OF VENTING SYSTEM</th>
<th>LOCATION OF REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listed Category I appliances</td>
<td>Type B gas vent</td>
<td>Section 509.6</td>
</tr>
<tr>
<td>Listed appliances equipped with draft hood</td>
<td>Chimney</td>
<td>Section 509.5</td>
</tr>
<tr>
<td>Appliances listed for use with Type B gas vent</td>
<td>Single-wall metal pipe</td>
<td>Section 509.7</td>
</tr>
<tr>
<td>Listed chimney lining system for gas venting</td>
<td>Listed chimney lining system for gas venting</td>
<td>Section 509.5.3</td>
</tr>
<tr>
<td>Special gas vent listed for these appliances</td>
<td>Special gas vent listed for these appliances</td>
<td>Section 509.4.3</td>
</tr>
<tr>
<td>Listed vented wall furnaces</td>
<td>Type B-W gas vent</td>
<td>Section 509.6</td>
</tr>
<tr>
<td>Category II, Category III, and Category IV appliances</td>
<td>As specified or furnished by manufacturers of listed appliances</td>
<td>Section 509.4.1 and Section 509.4.3</td>
</tr>
<tr>
<td>Appliances that can be converted to use solid fuel</td>
<td>Chimney</td>
<td>Section 509.5</td>
</tr>
<tr>
<td>Unlisted combination gas- and oil-burning appliances</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combination gas- and solid fuel-burning appliances</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appliances listed for use with chimneys only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlisted appliances</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Listed combination gas- and oil-burning appliances</td>
<td>Type L vent</td>
<td>Section 509.6</td>
</tr>
<tr>
<td></td>
<td>Chimney</td>
<td>Section 509.5</td>
</tr>
<tr>
<td>Decorative appliance in vented fireplace</td>
<td>Chimney</td>
<td>UMC Section 911.2</td>
</tr>
<tr>
<td>Gas-fired toilets</td>
<td>Single-wall metal pipe</td>
<td>Section 509.7</td>
</tr>
<tr>
<td>Direct-vent appliances</td>
<td>—</td>
<td>Section 509.2.6</td>
</tr>
<tr>
<td>Appliances with integral vents</td>
<td>—</td>
<td>Section 509.2.7</td>
</tr>
<tr>
<td>APPLIANCE</td>
<td>LISTED TYPE B GAS VENT MATERIAL</td>
<td>LISTED TYPE L VENT MATERIAL</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Listed appliances with draft hoods and appliances listed for use with Type B gas vents</td>
<td>As listed</td>
<td>As listed</td>
</tr>
<tr>
<td>Residential boilers and furnaces with listed gas conversion burner and draft hood</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Residential appliances listed for use with Type L vents</td>
<td>Not permitted</td>
<td>As listed</td>
</tr>
<tr>
<td>Unlisted residential appliances with draft hood</td>
<td>Not permitted</td>
<td>6</td>
</tr>
<tr>
<td>Residential and low-heat appliances other than those above</td>
<td>Not permitted</td>
<td>9</td>
</tr>
<tr>
<td>Medium-heat appliances</td>
<td>Not permitted</td>
<td>Not permitted</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25.4 mm

* These clearances shall apply unless the installation instructions of a listed appliance or connector specify different clearances, in which case the listed clearances shall apply.

**Notes:**

1 A – Equals the clearance with no protection specified in Table 509.7.3.4(1) and Table 509.7.3.4(2) and in the sections applying to various types of equipment.

2 B – Equals the reduced clearance permitted in accordance with Table 509.7.3.4(2).

3 The protection applied to the construction using combustible material shall extend far enough in each direction to make C equal to A.
Note: Masonry walls shall be attached to combustible walls using wall ties. Spacers shall not be used directly behind appliance or connector.

FIGURE 509.7.3.4(2)
WALL PROTECTOR CLEARANCE REDUCTION SYSTEM
[NFPA 54: FIGURE 10.3.2.3(b)-10.3.3.3(b)]

Note: Do not place masonry wall ties directly behind appliance or connector.

For SI units: 1 inch = 25.4 mm

FIGURE 509.7.3.4(3)
MASONRY CLEARANCE REDUCTION SYSTEM
[NFPA 54: FIGURE 10.3.2.3(e)-10.3.3.3(c)]

For SI units: 1 inch = 25.4 mm
TABLE 509.7.3.4(2)
REDUCTION OF CLEARANCES WITH SPECIFIED FORMS OF PROTECTION

<table>
<thead>
<tr>
<th>TYPE OF PROTECTION APPLIED TO AND COVERING ALL SURFACES OF COMBUSTIBLE MATERIAL WITHIN THE DISTANCE SPECIFIED AS THE REQUIRED CLEARANCE WITH NO PROTECTION [SEE FIGURE 509.7.3.4(1) THROUGH FIGURE 509.7.3.4(3)]</th>
<th>WHERE THE REQUIRED CLEARANCE WITH NO PROTECTION FROM APPLIANCE, VENT CONNECTOR, OR SINGLE-WALL METAL PIPE IS:</th>
<th>ALLOWABLE CLEARANCES WITH SPECIFIED PROTECTION (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ABOVE COLUMN 1</td>
<td>SIDES AND REAR COLUMN 2</td>
</tr>
<tr>
<td>(1) 3(\frac{1}{2}) inch thick masonry wall without ventilated air space</td>
<td>—</td>
<td>24</td>
</tr>
<tr>
<td>(2) (\frac{1}{2}) of an inch insulation board over 1 inch glass fiber or mineral wool batts</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>(3) 0.024 inch (nominal 24 gauge) sheet metal over 1 inch glass fiber or mineral wool batts reinforced with wire on rear face with ventilated air space</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>(4) 3(\frac{1}{2}) inch thick masonry wall with ventilated air space</td>
<td>—</td>
<td>12</td>
</tr>
<tr>
<td>(5) 0.024 inch (nominal 24 gauge) sheet metal with ventilated air space</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>(6) (\frac{1}{2}) of an inch thick insulation board with ventilated air space</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>(7) 0.024 inch (nominal 24 gauge) sheet metal with ventilated air space over 0.024 inch (nominal 24 gauge) sheet metal with ventilated air space</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>(8) 1 inch glass fiber or mineral wool batts sandwiched between two sheets 0.024 inch (nominal 24 gauge) sheet metal with ventilated air space</td>
<td>18</td>
<td>12</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25.4 mm, \(\text{°C} = \left(\text{°F}-32\right)/1.8\)

Notes:

1. Reduction of clearances from combustible materials shall not interfere with combustion air, draft hood clearance and relief, and accessibility of servicing.
2. All clearances shall be measured from the outer surface of the combustible material to the nearest point on the surface of the appliance, disregarding any intervening protection applied to the combustible material.
3. Spacers and ties shall be of noncombustible material. No spacer or tie shall be used directly opposite the
appliance or connector.

4 Where all clearance reduction systems use a ventilated air space, adequate provision for air circulation shall be provided as described. [See Figure 509.7.3.4(2) and Figure 509.7.3.4(3)]

5 At least 1 inch (25.4 mm) shall be between clearance reduction systems and combustible walls and ceilings for reduction systems using a ventilated air space.

6 Where a wall protector is mounted-installed on a single flat wall away from corners, it shall have a minimum 1 inch (25.4 mm) air gap. To provide adequate air circulation, the bottom and top edges, or only the side and top edges, or all edges shall be left open.

7 Mineral wool batts (blanket or board) shall have a minimum density of 8 pounds per cubic foot (lb/ft^3) (128 kg/m^3) and a minimum melting point of 1500°F (816°C).

8 Insulation material used as part of a clearance reduction system shall have a thermal conductivity of 1.0 British thermal unit inch per hour square foot degree Fahrenheit [Btu•in/(h•ft^2•°F)] [0.1 W/(m•K)] or less.

9 At least 1 inch (25.4 mm) shall be between the appliance and the protector. In no case shall the clearance between the appliance and the combustible surface shall not be reduced below that allowed in this table.

10 All clearances and thicknesses are minimum; larger clearances and thicknesses are acceptable.

11 Listed single-wall connectors shall be installed in accordance with the terms of their listing and the manufacturer’s installation instructions.

### TABLE 509.8.2 509.8.1

**THROUGH-THE-WALL DIRECT-VENT TERMINATION CLEARANCES**

[NFPA 54: TABLE 12.9.3 12.9.1]

<table>
<thead>
<tr>
<th>DIRECT-VENT APPLIANCE INPUT RATING</th>
<th>THROUGH-THE-WALL VENT TERMINAL CLEARANCE FROM ANY AIR OPENING INTO A BUILDING (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 000 Btu/h and less</td>
<td>6</td>
</tr>
<tr>
<td>Greater than 10 000 Btu/h and not exceeding 50 000 Btu/h</td>
<td>9</td>
</tr>
<tr>
<td>Greater than 50 000 Btu/h and not exceeding 150 000 Btu/h</td>
<td>12</td>
</tr>
<tr>
<td>&gt; 150 000 Btu/h</td>
<td>In accordance with the appliance manufacturer’s instructions and in no case less than the clearances specified for non-direct vent terminals in row B</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FIGURE CLEARANCE</th>
<th>CLEARANCE LOCATION</th>
<th>MINIMUM CLEARANCES FOR DIRECT VENT TERMINALS</th>
<th>MINIMUM CLEARANCES FOR NON-DIRECT VENT TERMINALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Clearance above finished grade level, veranda, porch, deck, or balcony</td>
<td>12 inches</td>
<td>12 inches</td>
</tr>
<tr>
<td>B</td>
<td>Clearance to window or door that is openable</td>
<td>6 inches for appliances ≤ 10 000 Btu/hr 9 inches for appliances &gt; 10 000 Btu/hr ≤ 50 000 Btu/hr 12 inches for appliances &gt; 50 000 Btu/hr ≤ 150 000 Btu/hr Appliances &gt; 150 000 Btu/hr, in accordance with the appliance manufacturer’s instructions and not less than the clearances specified for non-direct vent terminals in row B</td>
<td>4 feet below or to side of opening or 1 foot above opening</td>
</tr>
<tr>
<td>C</td>
<td>Clearance to non-openable window</td>
<td>None unless otherwise specified by the appliance manufacturer</td>
<td>None unless otherwise specified by the appliance manufacturer</td>
</tr>
<tr>
<td>D</td>
<td>Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (610 mm) from the center line of the terminal</td>
<td>None unless otherwise specified by the appliance manufacturer</td>
<td>None unless otherwise specified by the appliance manufacturer</td>
</tr>
<tr>
<td></td>
<td>Clearance to unventilated soffit</td>
<td>None unless otherwise specified by the appliance manufacture</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------</td>
<td>----------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Clearance to outside corner of building</td>
<td>None unless otherwise specified by the appliance manufacture</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Clearance to inside corner of building</td>
<td>None unless otherwise specified by the appliance manufacture</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Clearance to non-mechanical air supply inlet to building and the combustion air inlet to any other appliance</td>
<td>Same clearance as specified for row B</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Clearance to a mechanical air supply inlet</td>
<td>10 feet horizontally from inlet or 3 feet above inlet</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>Clearance above paved sidewalk or paved driveway located on public property or other areas where condensate or vapor can cause a nuisance or hazard</td>
<td>7 feet and not located above public walkways or other areas where condensate or vapor can cause a nuisance or hazard</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Clearance to underside of veranda, porch, deck, or balcony</td>
<td>12 inches where the area beneath the veranda, porch, deck, or balcony is open on not less than two sides. The vent terminal is prohibited in this location where only one side is open.</td>
<td></td>
</tr>
</tbody>
</table>

For SI Units: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW
FIGURE 509.8-509.8.1
EXIT TERMINALS OF MECHANICAL DRAFT AND DIRECT-VENT VENTING SYSTEMS
[NFPA 54: FIGURE A.12.9-12.9.1]

SUBSTANTIATION:
The above sections have been revised to correlate with NFPA 54-2021 (latest version) in accordance with IAPMO’s Regulations Governing Committee Projects (Extract Guidelines).

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

The TCC has the responsibility to resolve conflicts and achieve correlation among the recommendations of the Technical Committee. The TCC has the authority to choose between alternative text recommended by the Technical Committee, but only as necessary for correlation, consistency, and the correction of errors and omissions in accordance with Section 3-4 of the Regulations Governing Committee Projects.

Actions taken on UPC Item # 101, Section 508.4 (Appliances in Attics and Under-Floor Spaces) and UMC Item # 056, Section 304.4 (Appliances in Attics and Under-Floor Spaces) resulted in conflicting language within the code. In order to correlate the language, the Technical Correlating Committee proposed the following modifications to the UPC:

**508.4 Appliances in Attics and Under-Floor Spaces.** An attic or under-floor space in which an appliance is installed shall be accessible through an opening and passageway at least as large as larger than the largest component of the appliance, and not less than 22 inches by 30 inches (559 mm by 762 mm). {{NFPA 54:9.5.1}}

TCC ACTION:  ACCEPT AS SUBMITTED

TCC STATEMENT:
The language in UPC Item # 101, Section 508.4 (Appliances in Attics and Under-Floor Spaces) is being revised to correlate with the action taken by the UMC TC Item # 056, Section 304.4 (Appliances in Attics and Under-Floor Spaces) regarding the phrase “or under-floor space.”

Additionally, the TCC further modified UPC Item # 101 to change the phrase “at least as large as” to “larger than” as the TCC felt such revision of text was necessary to correct an error in the original text as sufficient accessibility through an opening is required.

The action moves forward as approved by the TCC and supersedes the recommendation from the UPC TC for actions taken for Section 508.4 regarding adding the phrase “or under-floor space” and a change from the phrase “at least as large as” to “larger than.”
Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 509.7.2  Item #: 101

SUBMITTER: IAPMO Staff - Update Extracts  NFPA 54 Extract Update  Comment #: 1

RECOMMENDATION:
Revise text

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

509.0 Venting of Appliances.

509.7 Single-Wall Metal Pipe. (remaining text unchanged)

509.7.2 Termination. The termination of single-wall metal pipe shall meet the following requirements:
(1) Single-wall metal pipe shall terminate at least 5 feet (1524 mm) in vertical height above the highest connected appliance draft hood outlet or flue collar. [NFPA 54:12.8.3(1)]
(2) Single-wall metal pipe shall extend at least 2 feet (610 mm) above the highest point where it passes through a roof of a building and at least 2 feet (610 mm) higher than any portion of a building within a horizontal distance of 10 feet (3048 mm). [NFPA 54:12.8.3(2)] (See Figure 509.5.4)
(3) An approved cap or roof assembly shall be attached to the terminus of a single-wall metal pipe. [NFPA 54:12.8.3(3)]

SUBSTANTIATION:
The above sections have been revised to correlate with NFPA 54-2021 (latest version) in accordance with IAPMO's Regulations Governing Committee Projects (Extract Guidelines).
Proposals

Item #: 103
UPC 2024  Section: 504.4

SUBMITTER: David Mann
CA State Pipe Trades Council

RECOMMENDATION:
Revise text

504.0 Water Heater Requirements.

504.4 Pressure Limiting Devices. A water heater installation shall be provided with overpressure protection using an approved, listed device installed in accordance with the terms of its listing and the manufacturer's installation instructions. Pressure relief devices shall have a pressure setting greater than the water service pressure and not exceed 150 psi (1034 kPa) as required in Section 608.4.

(below shown for reference only)

608.4 Pressure Relief Valves. Each pressure relief valve shall be an approved automatic type with drain, and each such relief valve shall be set at a pressure of not more than 150 psi (1034 kPa). No shutoff valve shall be installed between the relief valve and the system.

SUBSTANTIATION:
The proposed language is being added for clarity and safety of the end user. The UPC requires the plumbing water supply to be limited to 80 psi. While manufacturers usually install a pressure relief valve rated at 150 psi, there are over the counter relief valves rated at 75 psi which will cause the pressure to release. To prevent such incidences, the language will ensure the P&T valve is above the water supply pressure.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 21  NEGATIVE: 4  NOT RETURNED: 1  Daniels

EXPLANATION OF NEGATIVE:

BALLANCO: I would agree with Chuck White that this change does not add any clarity to the code. It may add confusion.

GORSUCH: Agree with Charles White. In addition, the maximum 150 psi may not be correct all the time. For example, for high-rise buildings, if I have a water heater in the basement the working pressure may exceed 150 psi.

KREITENBERG: Water Service is a term of art with a specific definition. The piping system within a building is not necessarily related to the pressure of the water service.

WHITE: This does not necessarily clarify the situation. The proposal is looking for a problem that does not exist and adds confusion. There is a difference between service pressure and pressure after a pressure reducing valve. It may be confusing to users as to which pressure to reference. Also, the rating of the relief valve should depend on the rating of the appliance being protected, the manufacturer's instructions should be followed.

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 504.4 - 504.6  Item #: 103


Comment #: 1

RECOMMENDATION:
Revise text

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

504.0 Water Heater Requirements.

504.4 Pressure Limiting Devices. A water heater installation shall be provided with overpressure protection using an approved, listed device installed in accordance with the terms of its listing and the manufacturer’s installation instructions. Pressure relief devices shall have a pressure setting greater than the water service pressure and not exceed 150 psi (1034 kPa) as required in Section 608.4.

504.5 Temperature Limiting Devices. A water heater installation or a hot water storage vessel installation shall be provided with overtemperature protection by means of an approved, listed device installed in accordance with the terms of its listing and the manufacturer’s installation instructions. {NFPA 54:10.26.5}

504.4 Relief valve. Water heaters and hot water storage tanks that operate above atmospheric pressure shall be protected with a pressure relief valve and temperature relief valve or combination temperature and pressure relief valve. The relief valve shall conform to ANSI Z21.22/CSA 4.4. The relief valve 504.6 Temperature, Pressure, and Vacuum Relief Devices. Temperature, pressure, and vacuum relief devices or combinations thereof, and automatic gas shutoff devices shall be installed in accordance with the terms of their listings and the manufacturer’s installation instructions. A shutoff valve shall not be placed between the relief valve and the water heater or on discharge pipes between such valves and the atmosphere. The hourly British thermal units (Btu) (kW•h) discharge capacity or the rated steam relief capacity of the device shall be not less than the input rating of the water heater. {NFPA 54:10.26.6} Discharge piping shall be installed in accordance with Section 608.5.

Note: ANSI Z21.22/CSA 4.4 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
The proponent correctly stated that this section needs clarity. However, the proposed change does not add clarity. It would appear more appropriate to rewrite the section and reference the correct standard, CSA Z21.22.

This change deletes the current text in Section 504.4, Section 504.5 and the first half of Section 504.6, replacing it with straightforward text requiring either a temperature relief valve and pressure relief valve or a combination temperature and pressure relief valve. The remaining part of original Section 504.6 is added to the end of the new text in Section 504.4.

There is no need to state that the relief valve must be set for a maximum pressure of 150 psi and a maximum temperature of 210 degrees F since that is already addressed in CSA Z21.22. By referencing the standard the maximum settings are established.

While Section 504.6 mentions vacuum relief device, this statement is unnecessary since vacuum relief valves are properly addressed in Section 608.7.
Proposals

Item #: 104

UPC 2024  Section: 507.5

SUBMITTER: Bob Adler
Self

RECOMMENDATION:
Revise text

507.0 Appliance and Equipment Installation Requirements.

507.5 Drainage Pan. Where a water heater is located in an attic, in or on an attic ceiling assembly, floor-ceiling assembly, or floor-subfloor assembly where damage results from a leaking water heater, a watertight pan of corrosion-resistant materials shall be installed beneath the water heater in accordance with the following:

(1) The drainage pan shall be provided with not less than 3/4 of an inch (20 mm) diameter drain to an approved location. The terminating end of the drainpipe shall be readily visible.

(2) The drainage pan shall be not less than 1 ½ inches (38 mm) in depth.

(3) Where a drain pan pipe is installed, the material of the piping shall be rated for the temperature rating of the water heater and shall be approved for use with the liquid being discharged.

SUBSTANTIATION:
The new text will add provisions which clarify that piping used on hot water applications shall be rated for such temperatures as there are drain line to be used for cold water applications only. Additionally, the provisions for the drainage pan are being placed in a list which makes the provisions easy to find.

COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC

Amend proposal as follows:

507.0 Appliance and Equipment Installation Requirements.

507.5 Drainage Pan. Where a water heater is located in an attic, in or on an attic ceiling assembly, floor-ceiling assembly, or floor-subfloor assembly where damage results from a leaking water heater, a watertight pan of corrosion-resistant materials shall be installed beneath the water heater in accordance with the following:

(1) The drainage pan shall be provided with not less than 3/4 of an inch (20 mm) diameter drain to an approved location. The terminating end of the drainpipe shall be readily visible.

(2) The drainage pan shall be not less than 1½ inches (38 mm) in depth.

(3) Where a drainage pan pipe is installed, the material of the piping shall be rated for the temperature rating of the water heater and shall be approved for use with the liquid being discharged.

(4) Discharge from a relief valve into a drainage pan shall be prohibited.

COMMITTEE STATEMENT:
The modification adds parts of Item #105, Item #106, and Item #107.

The modification clarifies that Section 507.5 is applicable to all locations where a leaking water heater can cause damage and not only the locations indicated in the section. The intent of the section is to prevent damage from occurring in the surrounding vicinity of the water heater should a leak occur. Additionally, the terminating end of the drain pipe shall be visible to alert the owner or inspector that the water heater is leaking.

This modification also adds (4) as the same prohibition of not allowing discharging the relief valve into a water heater pan that is in Section 608.5(7). It is a common mistake and needs to be stated in both sections.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS:  AFFIRMATIVE: 24  NEGATIVE: 1  NOT RETURNED: 1  Daniels

EXPLANATION OF AFFIRMATIVE:

BALLANCO: I believe the modification of Item (4) is incorrect. It appears that the proponent was attempting to regulate the drainage piping from the pan, not from the relief valve. While I am voting affirmative, I believe a correction is necessary.

EXPLANATION OF NEGATIVE:

WHITE: The proposal should direct the piping to be installed in the manner of relief valves and direct the user to Section 608.5 (Discharge Piping) where all of this is discussed. Adding the discharge of relief valves is already in Section 608.5 and is duplicative in this section. Having the end of the pipe readily visible, while proper, is not the same language used in Section 608.5 where it is "readily observable." The code should strive for consistent language.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 507.5  Item #: 104
SUBMITTER: Shane Peters  Self  Comment #: 1

RECOMMENDATION:
Revise text
Request to accept the code change proposal as modified by this public comment.

507.0 Appliance and Equipment Installation Requirements.

507.5 Drainage Pan. Where a water heater is located in an attic, in or on an attic ceiling assembly, floor-ceiling assembly, or floor-subfloor assembly or where structural damage may results from a leaking water heater, a watertight pan of corrosion-resistant materials shall be installed beneath the water heater in accordance with the following:
(1) The drainage pan shall be provided with not less than 3/4 of an inch (20 mm) diameter drain to an approved location. The terminating end of the drainpipe shall be readily visible.
(2) Such The drainage pan shall be not less than 1-1/2 inches (38 mm) in depth.
(3) Where a drainage pan pipe is installed, the material of the piping shall be rated for the temperature rating of the water heater and shall be approved for use with the liquid being discharged.
(4) Discharge from a relief valve into a drainage pan shall be prohibited.

SUBSTANTIATION:
The addition of the word 'structural' was previously rejected based on the observation that "the section covers more than just the structure."

If that is the intent, to mean that any damage that might be caused by a leaking water heater – including damage to boxes and their content sitting on a garage floor, ratchets up the liability to installers and inspectors beyond the original intent.

See attached documents going back to 1995 stating the purpose of requiring a pan is to protect the structure from water damage.

The additional revisions are to change the tense of a possible occurrence.

[Supporting documentation provided in KAVI for TC review]
PUBLIC COMMENT 2

Code Year: 2024 UPC  Section #: 507.5  Item #: 104

SUBMITTER: Arnie Rodio
Self

Comment #: 2

RECOMMENDATION:
Revise text

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

507.0 Appliance and Equipment Installation Requirements.

507.5 Drainage Pan. Where a water heater is located in an attic, in or on an attic ceiling assembly, floor-ceiling assembly, floor-subfloor assembly or where damage results from a leaking water heater, a watertight pan of corrosion-resistant materials shall be installed beneath the water heater in accordance with the following:
(1) The drainage pan shall be provided with not less than 3/4 of an inch (20 mm) diameter drain to an approved location. The terminating end of the drainpipe shall be readily visible.
(2) The drainage pan shall be not less than 1 1/2 inches (38 mm) in depth.
(3) Plastic drainage pans shall be not less than 0.036 inches (0.9 mm) in thickness. Galvanized steel or aluminum drainage pans shall be not less than 0.0236 inch (0.6010 mm) in thickness.
(4) Where a drainage pan pipe is installed, the material of the piping shall be rated for the temperature rating of the water heater and shall be approved for use with the liquid being discharged.
(5) Plastic drainage pans installed beneath gas-fired water heaters shall be constructed of material having a flame spread index not to exceed 25 and a smoke-developed index not to exceed 50, where tested in accordance with ASTM E84 or UL 723.
(46) Discharge from a relief valve into a drainage pan shall be prohibited.

Note: The ASTM E84 and UL 723 standards meet the requirements for mandatory reference standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
Thickness and testing requirements for drainage pans are missing from the code. The proposed change adds thickness requirements for plastic, galvanized steel, and aluminum drainage pans used for water heaters, as well as smoke and flame spread requirements for plastic drain pans used with gas-fired water heaters.
Proposals

Item #: 116
UPC 2024  Section: 509.10.10

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

509.0 Venting of Appliances.

509.10 Vent Connectors for Category I Appliances. (remaining text unchanged)

509.10.12 Passage through Ceilings, Floors, or Walls. A vent connector shall not pass through a ceiling, floor, or fire-resistance-rated wall. A single-wall metal pipe connector shall not pass through an interior wall.

Exceptions:
(1) Vent connectors made of listed Type B or Type L vent material and serving listed appliances with draft hoods and other appliances listed for use with Type B gas vents that pass through walls or partitions constructed of combustible material shall be installed with not less than the listed clearance to combustible material.
(2) Vent connectors shall be permitted to be installed in accordance with Section 509.7.3.1 and Section 509.7.3.5.

(The below sections are shown for information only)

509.7.3.1 Limitations. Single-wall metal pipe shall be used only for runs directly from the space in which the appliance is located through the roof or exterior wall to the outer air. A pipe passing through a roof shall extend without interruption through the roof flashing, roof jacket, or roof thimble. [NFPA 54:12.8.4.2]

509.7.3.5 Combustible Exterior Wall. Single wall metal pipe shall not pass through a combustible exterior wall unless guarded at the point of passage by a ventilated metal thimble not smaller than the following:
(1) For listed appliances with draft hoods and appliances listed for use with Type B gas vents, the thimble shall be a minimum of 4 inches (100 mm) larger in diameter than the metal pipe. Where there is a run of not less than 6 feet (1829 mm) of metal pipe in the opening between the draft hood outlet and the thimble, the thimble shall be a minimum of 2 inches (50 mm) larger in diameter than the metal pipe.
(2) For unlisted appliances having draft hoods, the thimble shall be a minimum of 6 inches (150 mm) larger in diameter than the metal pipe.
(3) For residential and low-heat appliances, the thimble shall be a minimum of 12 inches (300 mm) larger in diameter than the metal pipe.

Exception: In lieu of thimble protection, all combustible material in the wall shall be removed a sufficient distance from the metal pipe to provide the specified clearance from such metal pipe to combustible material. Any material used to close up such opening shall be noncombustible. [NFPA 54:12.8.4.6]

SUBSTANTIATION:
The intent of the exception to Section 509.10.12 is further clarified by directing the end user to Section 509.7.3.1 and Section 509.7.3.5 which permit connectors to pass through ceilings, floors, or wall and are specified in the indicated sections. This change will clarify the intent of Section 509.10.12 and avoid any confusion between the sections.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels
The TCC has the responsibility to resolve conflicts and achieve correlation among the recommendations of the Technical Committee. The TCC has the authority to choose between alternative text recommended by the Technical Committee, but only as necessary for correlation, consistency, and the correction of errors and omissions in accordance with Section 3-4 of the Regulations Governing Committee Projects.

Actions taken on UPC Item # 116, Section 509.10.12 (Passage Through Ceilings, Floors, or Walls) and UMC Item # 175, Section 802.10.12 (Passage Through Ceilings, Floors, or Walls) resulted in conflicting language between the codes. In order to correlate the language, the Technical Correlating Committee proposed the following modifications to the UPC:

**509.10.12 Passage Through Ceilings, Floors, or Walls.** A vent connector shall not pass through a ceiling, floor, or fire-resistance-rated wall. A single-wall metal pipe connector shall not pass through an interior wall.

**Exceptions:**
(1) Vent connectors made of listed Type B or Type L vent material and serving listed appliances with draft hoods and other appliances listed for use with Type B gas vents that pass through walls or partitions constructed of combustible material shall be installed with not less than the listed clearance to combustible material.
(2) Vent connectors shall be permitted to **be installed** pass through ceilings, floors, or walls in accordance with Section 509.7.3.1 and Section 509.7.3.5.

**TCC ACTION:** ACCEPT AS SUBMITTED

**TCC STATEMENT:**
The language in UPC Item # 116, Section 509.10.12 (Passage Through Ceilings, Floors, or Walls) is being revised to correlate with the action taken by the UMC TC for Item # 175, Section 802.10.12 (Passage Through Ceilings, Floors, or Walls) by changing the phrase “be installed” to “pass through ceilings, floors, or walls” in Exception (2).

The action moves forward as approved by the TCC and supersedes the recommendation from the UPC TC for actions taken for Section 509.10.12 to update the phrase from “be installed” to “pass through ceilings, floors, or walls” in Exception (2).

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**Appended Comments**

**PUBLIC COMMENT 1**

**Code Year:** 2024 UPC **Section #:** 509.10.12 **Item #:** 116

**SUBMITTER:** Julius Ballanco, P.E.  
JB Engineering and Code Consulting, P.C.  
Rep. Self  
**Comment #:** 1

**RECOMMENDATION:**  
Revise text

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

**SUBSTANTIATION:**  
The proponent is mixing single wall vent connectors with single wall metal vents. Single wall vent connectors are NOT permitted to pass through ceilings, floors, or walls. The vent connector must be completely located in the room in which the appliance is installed. The vent (not vent connector) is the passageway that exits the room passing through ceilings, floors, or walls.
Proposals

Item #: 129
UPC 2024  Section: 603.5.14.3

SUBMITTER: Cameron Rapoport
Watts Water Technologies

RECOMMENDATION:
Add new text

603.0 Cross-Connection Control.

603.5 Specific Requirements. (remaining text unchanged)

603.5.14 Protection from Fire Systems. (remaining text unchanged)

**603.5.14.3 One- or Two-Family, or Townhouse Residential Sprinkler Systems.** Except as provided in Section 603.5.14.1 and Section 603.5.14.2, potable water supplies to one- or two-family or townhouse residential sprinkler systems that are normally under pressure shall be protected from backpressure and backsiphonage by a backflow preventer in accordance with ASSE 1024.

(renumber remaining sections)

(below shown for reference only)

**603.5.14.1 Fire Department Connection.** Where fire protection systems supplied from a potable water system include a fire department (siamese) connection that is located less than 1700 feet (518.2 m) from a nonpotable water source that is capable of being used by the fire department as a secondary water supply, the potable water supply shall be protected by one of the following:

1. Reduced pressure principle backflow prevention assembly (RP)
2. Reduced pressure detector fire protection backflow prevention assembly

Nonpotable water sources include fire department vehicles carrying water of questionable quality or water that is treated with antifreeze, corrosion inhibitors, or extinguishing agents.

**603.5.14.2 Chemicals.** Where antifreeze, corrosion inhibitors, or other chemicals are added to a fire protection system supplied from a potable water supply, the potable water system shall be protected by one of the following:

1. Reduced pressure principle backflow prevention assembly (RP)
2. Reduced pressure detector fire protection backflow prevention assembly

*Note: ASSE 1024 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.*

**SUBSTANTIATION:**
Residential fire sprinkler systems in one- or two-family homes or townhouses are becoming more common, and the contents of those fire sprinklers should be protected against backsiphonage and backpressure. This is because common fire sprinkler system materials are often not lead free or otherwise appropriate for potable use, as well as the risk of legionella growth in stagnant systems. There are several ASSE 1024 compliant devices that also meet typical fire standards (UL) that do not put an unreasonable burden on the homeowner due to their lower cost and lack of testing requirements.
COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The term "normally" is not enforceable. The change is not clear as to what systems are "normally under pressure."

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 603.5.14

SUBMITTER: Chris B Haldiman Watts Water Technologies

RECOMMENDATION:
Add new text

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

603.0 Cross-Connection Control.

603.5 Specific Requirements. (remaining text unchanged)

603.5.14 Protection from Fire Systems. (remaining text unchanged)

603.5.14.3 One- or Two-Family, or Townhouse Residential Sprinkler Systems. Except as provided in Section 603.5.14.1 and Section 603.5.14.2, potable water supplies to one- or two-family or townhouse residential sprinkler systems that are pressurized shall be protected from backpressure and backsiphonage by a backflow preventer in accordance with ASSE 1024.

(below shown for reference only)

603.5.14.1 Fire Department Connection. Where fire protection systems supplied from a potable water system include a fire department (siamese) connection that is located less than 1700 feet (518.2 m) from a nonpotable water source that is capable of being used by the fire department as a secondary water supply, the potable water supply shall be protected by one of the following:
(1) Reduced pressure principle backflow prevention assembly (RP)
(2) Reduced pressure detector fire protection backflow prevention assembly

Nonpotable water sources include fire department vehicles carrying water of questionable quality or water that is treated with antifreeze, corrosion inhibitors, or extinguishing agents.

603.5.14.2 Chemicals. Where antifreeze, corrosion inhibitors, or other chemicals are added to a fire protection system supplied from a potable water supply, the potable water system shall be protected by one of the following:
(1) Reduced pressure principle backflow prevention assembly (RP)
(2) Reduced pressure detector fire protection backflow prevention assembly

Note: ASSE 1024 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
The committee statement as to why the proposal was rejected was “The term ‘normally’ is not enforceable. The change is not clear as to what systems are ‘normally under pressure’.”

I respectfully request reconsideration, with the “normally under pressure” language removed. This addition to the code will increase the safety level of the water system within the building.
Submitter: Herb Hoeptner  
Hoeptner Perfected Products

Recommendation:
Revise text

603.0 Cross Connection Control.

603.5.17 Potable Water Outlets and Valves. Potable water outlets, freeze-proof yard hydrants, combination stop-and-waste valves, freeze resistant drinking fountains or other fixtures that incorporate a stop and waste feature that drains into the ground shall not be installed underground.

Exception: Drinking fountain freeze resistant sanitary shall be permitted to be installed underground.

206.0 -D-
Drinking Fountain Freeze Resistant. An outdoor point of use valve used for potable water systems that uses a stop and waste below the frost line to protect against freezing. The device is normally installed in a vertical position extending from below the frost line to above grade.

Drinking Fountain Freeze Resistant Sanitary. An outdoor point of use valve used for potable water systems that drains back into an internal reservoir below the frost line to protect against freezing. The device is normally installed in a vertical position extending from below the frost line to above grade.

Substantiation:
An outside frost free drinking fountain are most common at parks, sports complexes, hiking trails, bike trails, dog parks and anywhere the public will need drinking water. The latest trend is to include bottle fillers and dog waterers. To prevent them from freezing they incorporate a stop and waste valve to drain the system into the soil. Standard yard hydrants (weep hole hydrants) that drain into the ground to prevent freezing, and all stop and waste valves are prohibited from being buried underground. An outside frost free drinking fountain drains into the soil the same as a weep hole hydrant or stop and waste and is currently not addressed as such in the UPC code. One can argue whether or not someone can get cross contamination from a stop and waste claiming the use is for filling bucket, but one cannot argue that the only purpose for a drinking fountain is to drink from it. Therefore it is imperative that we guarantee the quality of the water coming from a drinking fountain.

Definitions: There is no current definition of Drinking Fountain Freeze Resistant or the subcategory, Drinking Fountain Freeze Resistant Sanitary. These are generally accepted definitions.

Section 603.5.17 currently does not include outside frost free drinking fountains that use a stop and waste to protect from freezing. To prevent this text from being misinterpreted to read that all frost free drinking fountains including Sanitary frost free drinking fountains cannot be installed underground an exception needs to be added. Sanitary drinking fountains have been specifically designed to be installed below the frost line and supply potable drinking water.

Currently there are three manufacturers that manufacture a Sanitary Drinking Fountain that does not drain into the soil to prevent freezing. For more information on Drinking fountains please see attached

Is your outside drinking fountain safe for drinking?
If you use or install outside drinking fountains or yard hydrants you might want to concern yourself with the inevitable possibility that your potable water can become contaminated with harmful bacteria located in the soil.
Sure you hire the best contractors and you assume that you meet all the state and local requirements, but sometimes that is not enough. Some code authorities adopt codes but don’t necessarily enforce them, leaving you liable for any problems that develop. Some code authorities are slow to adopt the most current standards available, thus newly adopt an old standard after you have completed your project again leaving you liable. In this litigious society, sometimes you need to do more to ensure you do not become entangled in the litigation process.

How contaminated ground water can enter your potable water supply:
Typical outside drinking fountains and yard hydrants prevent freeze-ups by draining out of a “weep hole” deep in the ground. They generally consist of a bubbler, or in the case of a yard hydrant, a head for attaching a hose, a riser pipe, and a shutoff valve deep below the frost level. The term “weep hole” is derived from the fact that, when the weep hole drinking fountain or yard hydrant is shut off, a hole in the side of the valve opens to drain all the water from the riser into the soil below the frost line. These are sometimes referred to as Stop & Waste valves. A typical problem for these “weep hole” devices is that, when the ground water level fluctuates, especially during the summer months, or the device is used repeatedly so drain water does not have a chance to percolate into the ground, the ground water level will rise above the weep hole filling the riser with soiled ground water that will be consumed by the public. Each time the device is shut off (Fig. 1) and the weep hole opens, ground water will migrate into the drinking fountain or yard hydrant. Each time the drinking fountain or hydrant is turned on (Fig. 2), that contaminated migrated water enters the potable water supply system and exits the bubbler. That first drink of water can be nothing but soiled, most likely contaminated water.

A secondary, and more serious, problem occurs when the rubber seal in the shutoff valve or air valve deteriorates over time and begins to leak. When the valve on the kitchen sink leaks it is very noticeable as it will drip incessantly forcing you to replace the rubber seal. Unfortunately when your drinking fountain or yard hydrant leaks, it usually leaks out the weep hole deep in the ground undetected. From the surface no one is aware the device is leaking. When a back siphonage condition occurs (Fig.3), that leak out will become a leak in, sucking contaminated muddy water into the supply line. If the hydrant is located in a horse arena or cow barn, animal by-products will leach into the potable water supply.
In the first scenario the end user can consume contaminated water. In the second scenario, it is far more serious because the entire water supply can become contaminated which the public consumes. This means that possible contamination from one drinking fountain or yard hydrant, in one area, could cross contaminate the public in other areas or other commercial or private dwellings. Anyone connected to that water supply potentially can become contaminated.

Lately, due to the deaths associated with e-coli outbreaks and other pathogens that have contaminated our water supplies, there has been great concern regarding cross contamination between the soil, which carries animal by-products, fertilizers and other waste, and the water supply.

The liability toward each state became such a concern that many states created their own drinking fountain and yard hydrant requirements. Initially, states implemented requirements to isolate weep hole devices from the potable water supply. These requirements included installing a testable RPP backflow preventer upstream of the hydrant and then tagging the hydrant “danger unsafe water.” This solved two major concerns. First, it protected the potable water supply from siphoning contaminated water into the public water system, and secondly, it attempted to notify the public not to use the hydrant for any potable source. Naturally the obvious downside to this approach was that drinking fountains and yard hydrants had to be used as a potable source. Drinking fountains are only used for drinking, and yard hydrants are used for RV parks and campgrounds. A secondary down side is the cost associated with the purchase and installation of a testable RPP backflow preventer, the difficulty in finding a location for the backflow preventer to keep it from freezing and the added cost in annual inspection and testing of the backflow preventer.

Innovative manufacturers soon developed a new breed of drinking fountains and yard hydrants to solve the problems associated with the new requirements imposed on weep hole devices. These new devices are called Sanitary Drinking Fountains (Fig. 4) and Sanitary Yard Hydrants.

These Sanitary devices work much the same way as a Weep Hole device in that when they are shut off the water in the riser drains down and out a hole located below the frost line to prevent freezing. However, instead of draining out a hole and into the soil, the Sanitary Hydrant, or Sanitary Drinking Fountain (Fig. 4), drains into a sealed tank. When the hydrant is turned on again the water in the tank is expelled leaving the tank empty to repeat the cycle when the device is again shut off. Because the Sanitary drinking fountain and yard hydrant drain into a tank there is no cross contamination with the soil. Because the soil is not required for drainage the drinking fountain or yard hydrant can be placed in any soil condition, even clay.
Fig. 4
With the advent of the Sanitary Drinking Fountain and Sanitary Yard Hydrant, states were able to meet the needs and safety requirements of the public. The problem for the state or local code officials was the cost, manpower and liability in having to develop their own approval process and testing each manufacturer’s device for approval. In turn, the varying requirements by each state made it difficult for manufacturers to make one product for all states.

ASSE (American Society of Sanitary Engineers) realized the need to develop a national standard to help states avoid this liability and give manufacturers the ability to meet one set of requirements. After six years of debate and research by code officials, manufacturers, engineers, consultants, and the public, ASSE Sanitary Yard Hydrant Standard 1057 was completed. This standard requires that the hydrant not drain directly into the ground and it must have a back flow preventer if a hose is capable of attachment. It stipulates required pressure and flow capabilities and ensures proper freeze protection.

It’s obvious that over the past few years the sanitary issue for drinking fountains and yard hydrants has become an important issue for public safety, and although the 1057 Sanitary Yard Hydrant Standard has not yet specifically addressed drinking fountains, it is important to realize ones potential risk of cross contamination and possible liability when installing or specifying drinking fountains and yard hydrants. For yard hydrants, make sure they have been tested by an approved test lab and listed by a third party certifier to the ASSE 1057 standard. For drinking fountains make sure they are Sanitary drinking fountains where the freeze protection draining does not drain directly into the ground.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
There has been a long standing agreement to not install drinking fountain piping underground. There is no guidance regarding the depth requirements in the proposed change. The term "sanitary" may conflict with the way it is used in the code. Furthermore, nothing in this code prohibits the use of such installation, therefore, the change is not needed.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 206.0, 603.5.17  Item #: 130
SUBMITTER: Herb Hoeptner  Hoeptner Perfected Products  Comment #: 1

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
See original substantiation.
Proposals

Item #: 131
UPC 2024  Section: 227.0, 603.5.17

SUBMITTER:  Herb Hoeptner
Hoeptner Perfected Products

RECOMMENDATION:
Revise text

603.0 Cross Connection Control.

603.5.17 Potable Water Outlets and Valves. Potable water outlets, freeze-proof non-sanitary yard hydrants, combination stop-and-waste valves, or other fixtures that incorporate a stop and waste feature that drains into the ground shall not be installed underground.

Exception: Freeze-resistant sanitary yard hydrants that meet the requirements of ASSE 1057 shall be permitted to be installed underground.

227.0  -Y-
Yard Hydrant. A point-of-use valve used for nonpotable water systems that is protected against freezing by draining residual water onto the soil (which can be a source of cross-contamination). The device is normally installed in a vertical position extending from below the frost line to above grade.

Yard Hydrant, Sanitary. A point-of-use valve used for potable water systems that drains back into an internal reservoir below the frost line to protect against freezing. The device incorporates a backflow prevention device with hose connection outlet for potable water application. The device is normally installed in a vertical position extending from below the frost line to above grade.

Note: ASSE 1057 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
Standard yard hydrants (weep hole hydrants) that drain into the ground to prevent freezing, are normally used for irrigation but are typically attached to a potable water supply. It has been determined that weep hole yard hydrants can cross contaminate to the potable water supply lines, contaminating homes and buildings upstream of the hydrant. Those same hydrants are also being used for potable water supply for campsites, Recreational Vehicles (RV) and trailer parks, creating more cross contamination problems for the end user's potable water. Please see additional information.

An ASSE 1057 Sanitary Yard Hydrant approved device protects the water supply from cross contamination with the soil. These devices do not behave as a weep hole hydrant (such as a stop and waste device) as they do not have an opening into the soil to drain the excess water from the device. Devices capture water in an internal reservoir below the frost line to prevent cross contamination from the soil. They could be buried in a septic tank and still deliver clean potable water as they are totally isolated from the surrounding soil conditions. This is why they have been deemed Sanitary.

The purpose of this proposed change is to clarify the definition and installation of freeze resistant sanitary yard hydrants which is currently not addressed in the UPC code

Definitions: There is no current definition of Yard Hydrant or the subcategory, Sanitary Yard Hydrant. These are generally accepted definitions.
Section 603.5.17 can currently be misinterpreted to read that all yard hydrants including Sanitary yard hydrants cannot be installed underground, when in fact the product is specifically designed to be installed below the frost line and supply potable water. Currently there are three manufacturers that are listed to ASSE 1057 Sanitary Yard Hydrant standard.

In summary:
Most states have taken it upon themselves to require Sanitary Yard Hydrants to meet the ASSE 1057 Standard. Any engineer who is familiar with ASSE 1057 will make it a requirement, even if the state does not, because they are concerned for their own liability. The UPC code currently does not address Sanitary Yard Hydrants. This verbiage, including the requirement to meet ASSE 1057, is currently used by most states. Any engineer who specifies a yard hydrant will always specify a 1057 approved device for their own liability. This Sanitary Yard Hydrant addition has been sorely neglected in the UPC codes.

Serious Cross Contamination In Yard Hydrants:
Due to the deaths associated with e-coli outbreaks and other pathogens that have contaminated our water supplies, there has been great concern regarding cross contamination between the potable water supply and the soil, which carries animal by-products, fertilizers and other hazardous materials.

Most of us are familiar with a standard “weep hole” Yard Hydrant as they have been around for years. Hundreds of thousands of them are sold each year. They are used in campgrounds, RV parks, ranches, farms, gardens and anywhere water is needed away from a building. However, most of us are unaware of the serious cross contamination potential associated with the weep hole at the base of the hydrant. The common weep hole yard hydrant consists of a head for attaching a hose, a riser pipe, and a shutoff valve deep below the frost level. The term “weep hole” is derived from the fact that, when the weep hole hydrant is shut off, a hole in the side of the valve opens up to drain all the water from the riser into the soil below the frost line, much like a Stop and Waste Valve. Some are placed in a backfill of gravel to aid in draining.

Most states agencies recognize the cross contamination potential anytime a hose is connected to a hydrant. Hoses have the ability to be placed in high hazard environments, such as stock tanks, pesticide tanks or even lying on the ground in mud puddles. Back Siphonage will cause these hazardous materials to be sucked back into the water supply. Back siphonage can occur whenever a supply line is broken or drained for repair. In addition, yard hydrants create a back siphonage each and every time they are shut off, as the mere act of draining the riser, creates a siphon at the hose bib. Because of this, many states have required vacuum breakers to be attached to all hydrants where a hose could be attached. Naturally this prevents cross contamination during back siphonage should the hose be placed in a contaminated environment.

What many agencies are starting to realize is, that there still exists a severe cross contamination potential associated with the weep hole being in contact with the soil. Because these weep hole hydrants function much the same way as a Stop and Waste Valve, they suffer the same cross contamination issues. For example, if the stopper in a standard “weep hole” hydrant ever leaks, it is undetectable at ground level as it is leaking out the weep hole deep into the ground. The hydrant weep hole drips continuously throughout the day and night, and from the surface no one is aware the hydrant is leaking.

When a back siphonage condition occurs, that leak out will become a leak in, sucking contaminated muddy water into the supply line. If the hydrant is located in a horse or cow barn, animal by-products will leach into the potable water supply.
Even when the hydrant is working properly, in states where the ground water level fluctuates, this problem is exacerbated by the fact that when the water table rises above the weep hole, like when it rains, the backfill of gravel gets full of water. Any water higher that the weep hole will migrate contaminated water into the riser. Now every time one turns on the hydrant they will get a slug of contaminated water entering the potable water of an RV or camper. Each time the hydrant is shut off and the weep hole opens, permitting contaminated water to migrate into the hydrant. Each time the hydrant is turned on, that contaminated water enters the potable water supply system. Outside drinking fountains operate the same way. Each time the fountain is turned on, the first drink of water is nothing but soiled, possibly contaminated, water.

The liability toward each state became such a concern that many states created their own yard hydrant requirements. Initially, states implemented requirements to isolate weep hole hydrants from the potable water supply. These requirements included installing a testable RPP backflow preventer upstream of the hydrant and then tagging the hydrant “danger unsafe water.” This solved two major concerns. First, it protected the potable water supply from siphoning contaminated water into the public water system, and secondly, it attempted to notify the public not to use the hydrant for any potable source. The downside to this approach was the cost associated with the purchase and installation of a testable RPP backflow preventer, the difficulty in finding a location for the RPP device to keep it from freezing, the added cost in annual inspection and testing of the RPP device, and the fact that the weep hole yard hydrant is not fit for potable water. RV parks and campgrounds were especially hard hit, as they required potable water from their hydrants.

Manufacturers soon developed a new breed of yard hydrants to solve the problems associated with the new requirements imposed on weep hole hydrants. These new hydrants are called Sanitary Yard Hydrants.

A Sanitary Yard Hydrant works much the same way as a Weep Hole Hydrant in that when they are shut off, the water in the riser drains down and out a hole located below the frost line to prevent freezing. However, instead of draining out a hole and into the soil, the Sanitary Hydrant drains into a sealed tank. When the hydrant is turned on again, the water in the tank is expelled leaving the tank empty to repeat the cycle when the hydrant is again shut off. Because the sanitary hydrant drains into a tank there is no cross contamination with the soil. Because the soil is not required for drainage the hydrant can be placed in any soil condition, even clay. With the addition of a vacuum breaker at the hose connection, the Sanitary Yard Hydrant protects the potable water supply and public from cross contamination from the soil and from the hose.

The problem for the state and local code officials was the cost, manpower, and liability in having to develop their own approval process and testing each manufacturer’s device for approval. In turn, the varying requirements by each state made it difficult for manufacturers to make one product for all states.

ASSE realized the need to develop a national standard to help states avoid this liability and give manufacturers the ability to meet one set of requirements. After six years of debate and research by code officials, manufacturers, engineers, consultants, and the public, ASSE’s Sanitary Yard Hydrant Standard 1057 was completed. This standard requires that the yard hydrant not drain directly into the ground and that it must have a back flow preventer if a hose
is capable of attachment. In addition, it stipulates minimum required pressure and flow capabilities and ensures proper freeze protection and that all serviceable parts can be accomplished without the need to excavate. It also stipulates, the manufacturers must test their hydrants at an approved and regulated test lab.

This standard reduces the liability, manpower, and costs for the state agencies to ensure proper protection of the water supply and the public. At the same time it helps manufacturers to have a base line from which to develop and improve yard hydrants in general.

With the continued efforts by states for clean, safe, potable water and the high liability associated with cross contamination, greater concern must be given to the proper selection, installation and use of yard hydrants.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The term "sanitary" may conflict with the way it is used in other parts of the code. There should be a separation between the potable and nonpotable requirements. Furthermore, nothing in this code prohibits the use of such installation and therefore not needed.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Public Comment 1

Code Year: 2024 UPC  Section #: 227.0, 603.5.17  Item #: 131

SUBMITTER: Herb Hoeptner  Comment #: 1
Hoeptner Perfected Products

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
See original substantiation.
Proposals

Item #: 132

UPC 2024  Section: 603.5.21.1, 603.5.21.2, Table 1701.1, Table 1701.2

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Add new text

603.0 Cross-Connection Control.

603.5 Specific Requirements. (remaining text unchanged)

603.5.21 Chemical Dispensers. The water supply to chemical dispensers shall be protected against backflow. The chemical dispenser shall comply with ASSE 1055 or the water supply shall be protected by one of the following methods:
(1) Air gap
(2) Atmospheric vacuum breaker (AVB)
(3) Pressure vacuum breaker backflow prevention assembly (PVB)
(4) Spill-resistant pressure vacuum breaker (SVB)
(5) Reduced-pressure principle backflow prevention assembly (RP)

603.5.21.1 Pressure Relief Device. Chemical dispensers receiving their water supply from a service or mop basin faucet or fixture fitting, shall be provided with a pressure relief device attached to the hose threads of the faucet or fixture fitting prior to the connection of the chemical dispenser. The pressure relief device shall comply with IAPMO PS 104 and shall have a constant bleed of water when the service or mop sink faucet is in use. An individual water supply to the chemical dispenser shall be permitted to be used to supply water to the chemical dispenser.

603.5.21.2 Water Connection. Chemical dispensers used to supply cleaning or sanitizing chemicals to commercial kitchen sinks and dishwashers shall have an individual water connection to the potable water system. Alteration of listed faucets or fixture fittings to supply water to a chemical dispenser or other dispensing devices shall be prohibited.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO PS 104-2019</td>
<td>Pressure Relief Connection for Dispensing Equipment</td>
<td>Valves</td>
<td>603.5.21.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: IAPMO PS 104 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO PS 104-1997</td>
<td>Pressure Relief Connection for Dispensing Equipment</td>
<td>Valves</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)
SUBSTANTIATION:
Currently, it is a common practice by many of the chemical dispenser companies to supply water to their devices by connecting their product to the hose threads on a mop sink faucet using a wye connection. By closing the stop on the other half of the wye connection, constant pressure would be applied to atmospheric vacuum breaker on the faucet. Atmospheric vacuum breakers may not have down stream valves or constant pressure per Table 603.2 of the 2021 UPC. This device provides a continuous flow of water through the "bleed tee" when the faucet is on, thereby eliminating the issue with downstream valving, as well as reminds the user to shut the water off to the fixture.

Currently, many chemical dispenser companies will install a brass tee in the faucet spout of a commercial kitchen sink to supply water to their device. Section 301.2 of the 2021 UPC requires all plumbing fixture fittings and faucets to be tested to applicable standards and listed by an accredited third party listing agency. A listed faucet or fixture fitting that has been altered with the insertion of a tee voids the listing for the faucet or fixture fitting. An individual water supply to the chemical dispenser would be needed to comply with the requirements found in the UPC.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed change is being rejected as the wording is confusing and the intent is not clear. The proposal should be reworded and submitted as a public comment.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024 UPC  Section #: 603.5.21, Table 1701.1, Table 1701.2  Item #: 132
SUBMITTER: Phillip H Ribbs  PHR Consultants  Comment #: 1
RECOMMENDATION:
Revise text
Request to replace the code change proposal by this public comment.

603.0 Cross-Connection Control.

603.5 Specific Requirements. (remaining text unchanged)

603.5.21 Chemical Dispensers. The water supply to chemical dispensers shall be protected against backflow by one of the following:
(1) The chemical dispenser shall comply with ASSE/IAPMO 1055. Where an installation involves a water source coming from a faucet with an integrated vacuum breaker device, a pressure bleed device conforming to IAPMO PS 104 shall be used to protect the vacuum breaker device.
(2) Water supply shall be protected by one of the following methods:
(a) Air gap
(b) Atmospheric vacuum breaker (AVB)
(c) Pressure vacuum breaker backflow prevention assembly (PVB)
(d) Spill-resistant pressure vacuum breaker (SVB)
(e) Reduced-pressure principle backflow prevention assembly (RP)
TABLE 1701.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO PS 104-2019</td>
<td>Pressure Relief Connection for Dispensing Equipment</td>
<td>Valves</td>
<td>603.5.21</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: IAPMO PS 104 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO PS-104-1997</td>
<td>Pressure Relief Connection for Dispensing Equipment</td>
<td>Valves</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
The purpose is so that continuous pressure does not adversely affect the vacuum breaker device upstream of the pressure bleed device. This also protects against a cross-connection between hot and cold water migration.

The language was originally part of previous editions ASSE 1055, but was removed since it was related to installation requirements. The proposed text will keep the original intent of protecting the device.
Proposals

Item #: 133

UPC 2024  Section: 604.1

SUBMITTER: Pennie Feehan
Pennie L Feehan Consulting
Rep. Copper Development Association

RECOMMENDATION:
Revise text

604.0 Materials.

604.1 Pipe, Tube, and Fittings. Pipe, tube, fittings, solvent cement, thread sealants, solders, and flux used in potable water systems intended to supply drinking water shall comply with NSF 61. Where copper alloys pipe, fittings and valves are made from copper alloys containing more than 15 percent zinc by weight and are used in plastic piping systems, they shall be resistant to dezincification and stress corrosion cracking in compliance with NSF 14.

Materials used in the water supply system, except valves and similar devices, shall be of a like material, except where otherwise approved by the Authority Having Jurisdiction.

Materials for building water piping and building supply piping shall comply with the applicable standards referenced in Table 604.1.

SUBSTANTIATION:
The original sentence is confusing and wordy. This code section was created because of a manufacturing issue that has been corrected in NSF 14 - Plastics Piping System Components and Related Materials, Section 5.8.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The Technical Committee is aware that the dezincification provisions are covered in NSF 14, but feel it is important to reference it in the text; no reason was provided to remove the language. The existing language assists the end user by indicating the dezincification requirements without having to look at the standard.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 25   NOT RETURNED: 1   Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 606.1

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

Request to replace the code change proposal by this public comment.
606.0 Valves.
606.1 General. Valves up to and including 2 inches (50 mm) in size shall be copper alloy or other approved material. Sizes exceeding 2 inches (50 mm) shall be permitted to have cast iron or copper alloy bodies. Each gate or ball valve shall be a fullway or full-port type with working parts of the noncorrosive material. Where valves are made from copper alloys containing more than 15 percent zinc by weight and are used in plastic piping systems, they shall be resistant to dezincification and stress corrosion cracking in compliance with NSF/ANSI 14. Valves carrying water used in potable water systems shall comply with the requirements of ASME A112.4.14, ASME B16.34, ASTM F1970, ASTM F2389, AWWA C500, AWWA C504, AWWA C507, IAPMO Z1157, MSS SP-67, MSS SP-70, MSS SP-71, MSS SP-72, MSS SP-78, MSS SP-80, MSS SP-110, MSS SP-122, or NSF 359. Valves intended to supply drinking water shall also comply with the requirements of NSF/ANSI/CAN 61.

(below shown for reference only)

604.0 Materials.
604.1 Pipe, Tube, Fittings. Pipe, tube, fittings, solvent cement, thread sealants, solders, and flux used in potable water systems intended to supply drinking water shall comply with NSF/ANSI/CAN 61. Where pipe fittings and valves are made from copper alloys containing more than 15 percent zinc by weight and are used in plastic piping systems, they shall be resistant to dezincification and stress corrosion cracking in compliance with NSF/ANSI 14. Materials used in the water supply system, except valves and similar devices, shall be of a like material, except where otherwise approved by the Authority Having Jurisdiction. Materials for building water piping and building supply piping shall comply with the applicable standards referenced in Table 604.1.

Note: NSF/ANSI 14 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
The language contained in Section 604.1 (Pipe, Tube, Fittings) regarding dezincification applies to the whole water supply system, including valves. Someone looking for provisions for the “valves” alone, will miss the part about the dezincification. Therefore, it is recommended that this language be repeated to bring the language to the attention of the end user.
Proposals

Item #: 138
UPC 2024 Section: Table 604.1, Table 1701.1

SUBMITTER: Michael Cudahy
PPFA

RECOMMENDATION:
Revise text

**TABLE 604.1**
MATERIALS FOR BUILDING SUPPLY AND WATER DISTRIBUTION PIPING AND FITTINGS

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>BUILDING SUPPLY PIPE AND FITTINGS</th>
<th>WATER DISTRIBUTION PIPE AND FITTINGS</th>
<th>REFERENCED STANDARD(S) PIPE</th>
<th>REFERENCED STANDARD(S) FITTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE-RT</td>
<td>X</td>
<td>X</td>
<td>ASTM F2769, CSA B137.18</td>
<td>ASSE 1061, ASTM D3261, ASTM F1055, ASTM F1807, ASTM F2098, ASTM F2159, ASTM F2735, ASTM F2769, <strong>ASTM F3347</strong>, <strong>ASTM F3348</strong>, CSA B137.18</td>
</tr>
</tbody>
</table>

Note: ASTM F3347 and ASTM F3348 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

**TABLE 1701.1**
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM F3347-2020a</td>
<td>Metal Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>ASTM F3348-2020b</td>
<td>Plastic Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing to the Piping System table.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The scopes of ASTM F3347 and ASTM F3348 cover water distribution fittings but do not address building supply pipe and fittings. The change needs clarification to show that the standards are only applying to water distribution pipe and fittings.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 20  NEGATIVE: 5  NOT RETURNED: 1  Daniels

EXPLANATION OF NEGATIVE:

BALLANCO: This change should have been accepted. The substantiation justifies the proposed change.

BROWN, GORSUCH: Agree with Michael Cudahy.

CUDAHY: The rejection misses the fact that not all of the fittings listed are intended for direct burial, which is important. Fittings for hot and cold distribution are tested to more rigorous conditions than service only type fittings.

NIELSEN: There was nothing wrong with this proposal.

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Appended Comments

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PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Table 604.1, Table 1701.1  Item #: 138

SUBMITTER: Jeff Matson (Viega LLC); Jim Kendzel (ASA); Mike Cudahy (PPFA)  Comment #: 1

RECOMMENDATION:

Revise text

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

### TABLE 604.1

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>BUILDING SUPPLY PIPE AND FITTINGS</th>
<th>WATER DISTRIBUTION PIPE AND FITTINGS</th>
<th>REFERENCED STANDARD(S) PIPE</th>
<th>REFERENCED STANDARD(S) FITTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE-RT</td>
<td>X</td>
<td>X</td>
<td>ASTM F2769, CSA B137.18</td>
<td>ASSE 1061, ASTM D3261, ASTM F1055, ASTM F1807, ASTM F2098, ASTM F2159, ASTM F2735, ASTM F2769, <strong>ASTM F3347, ASTM F3348</strong>, CSA B137.18</td>
</tr>
</tbody>
</table>

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<tr>
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<td>Metal Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>ASTM F3348-2021a</td>
<td>Plastic Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

**Note:** ASTM F3347 and ASTM F3348 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

**SUBSTANTIATION:**

**Jeff Matson**

ASTM Standards F3347 and F3348 have been revised to include the building supply application for PEX. These PEX fittings are commonly used in both supply and distribution piping applications, so this revision addresses the Committee’s earlier reason for rejection. The ASTM F17 Committee approved revisions to the scopes of these standards without objection, so at this time the scopes of ASTM F3347 & F3348 now match scopes of other PEX fitting standards included in the PEX line of UPC Table 604.1. Updated standards have been published as ASTM F3347-2021 and ASTM F3348-2021a. We hope that the TC will accept the amended proposal which adds these ASTM standards to the Referenced Standards for Fittings used in PEX supply and distribution pipe in Table 604.1, and to Table 1701.1.

**Michael Cudahy**

Per the TC request, the standards have recently been updated to include language about the suitability of the fittings for the 'water service lines' application. See below;

ASTM F3347-21: "1.1.1 When used with PEX tubing in accordance with Specification F876, the fittings covered by this specification are intended for use in, but not limited to, residential and commercial, hot- and cold-potable water distribution systems, water service lines, reclaimed water, fire protection, radiant heating and cooling systems, hydronic distribution systems, snow and ice melting systems, geothermal ground loops, district heating, turf conditioning, compressed air distribution and building services pipe."

ASTM F3348-21a: "1.1.1 When used with PEX tubing in accordance with Specification F876, the fittings covered by this specification are intended for use in, but not limited to, residential and commercial, hot- and cold-potable water distribution systems, water service lines, reclaimed water, fire protection, radiant heating and cooling systems, hydronic distribution systems, snow and ice melting systems, geothermal ground loops, district heating, turf conditioning, compressed air distribution and building services pipe."

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Proposals

Item #: 140
UPC 2024  Section: 604.5, 604.12

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Revise text

604.0 Materials.

604.5 Flexible Connectors. Flexible water connectors shall be installed in readily accessible locations, and where under continuous pressure shall comply with ASME A112.18.6/CSA B125.6. Flexible water connectors with an excess flow shutoff device shall comply with CSA B125.5/IAPMO Z600.

604.12 Flexible Corrugated Connectors. Flexible corrugated connectors of copper, copper alloy, or stainless steel water connectors shall be installed in readily accessible locations and shall comply with ASME A112.18.6/CSA B125.6. Flexible water connectors with an excess flow shutoff device shall comply with CSA B125.5/IAPMO Z600. Such connectors shall be limited to the following connector lengths:
1. Fixture Connectors – 30 inches (762 mm)
2. Washing Machine Connectors – 72 inches (1829 mm)
3. Dishwasher and Icemaker Connectors – 120 inches (3048 mm)
4. Other Connections – 48 inches (1220 mm)

SUBSTANTIATION:
The change deletes Section 604.5 and relocates the language to Section 604.12. The existing language of Section 604.12 was added in 2000 (see original proposal and reason statement in at the end of the substantiation) while the field of flexible water connectors was still developing. The term “corrugated” still used in the section title now seems archaic for the current application described.

Corrugated connectors (see images below) are distinctive in appearance, were a very small portion of the market (perhaps is even smaller now) and were primarily developed for larger diameter connections. Certainly not for the relatively small and flexible diameters that serve fixture connectors, dishwasher and icemaker connections. They are not well suited for close radius change of directions like the 180° change required for most clothes washer connections.

All the Flexible Corrugated Connectors are listed to ASME A112.18.6/CSA B125.6.

Explanation:
1. Removes the specific materials section included and opens it to any material meeting the standard.
2. Removes the dubious statement “where under continuous pressure shall comply with...” They should comply with the standard whether under pressure or not.
3 Water Heater Connectors are still in the following section
COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
There is no technical justification given for adding (4) to limit all "other connections" to 48 inches in length. The change is generalizing corrugated connectors, however, such provisions may not be applicable to all connectors.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 604.5, 604.12 Item #: 140

SUBMITTER: Douglas Kirk Self

RECOMMENDATION:
Revise text

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

604.0 Materials.

604.5 Flexible Connectors. Flexible water connectors shall be installed in readily accessible locations, and where under continuous pressure shall comply with ASME A112.18.6/CSA B125.6. Flexible water connectors with an excess
flow shutoff device shall comply with CSA B125.5/IAPMO Z600. Such connectors shall be limited to the following lengths:
(1) Fixture Connectors – 30 inches (762 mm)
(2) Washing Machine Connectors – 72 inches (1829 mm)
(3) Dishwasher and Icemaker Connectors – 120 inches (3048 mm)

604.12 Flexible Corrugated Connectors. Flexible corrugated connectors of copper, copper alloy, or stainless steel shall be limited to the following connector lengths:
(1) Fixture Connectors—30 inches (762 mm)
(2) Washing Machine Connectors—72 inches (1829 mm)
(3) Dishwasher and Icemaker Connectors—120 inches (3048 mm)

SUBSTANTIATION:
The proposed change is combining two related sections with some modification. 1. Connectors comply with the same standard, whether corrugated or not. 2. Connectors need to comply with the standards whether they are under pressure or not. 3. Common connectors need length limitations. Currently, they have none.

[Supporting documentation provided in KAVI for TC review]

PUBLIC COMMENT 2

Code Year: 2024 UPC Section #: 604.5, 604.12 Item #: 140
SUBMITTER: Shane Peters Self
Comment #: 2

RECOMMENDATION:
Revise text

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

604.0 Materials.

604.5 Flexible Connectors. Flexible water connectors shall be installed in readily accessible locations, and where under continuous pressure shall comply with ASME A112.18.6/CSA B125.6. Flexible water connectors with an excess flow shutoff device shall comply with CSA B125.5/IAPMO Z600.

604.12 Flexible Corrugated Water Connectors. Flexible corrugated connectors of copper, copper alloy, or stainless steel water connectors shall be installed in readily accessible locations, and shall comply with ASME A112.18.6/CSA B125.6. Flexible water connectors with an excess flow shutoff device shall comply with CSA B125.5/IAPMO Z600. Flexible water connectors shall be limited to the following connector lengths:
(1) Fixture Connectors – 30 inches (762 mm)
(2) Washing Machine Connectors – 72 inches (1829 mm)
(3) Dishwasher and Icemaker Connectors – 120 inches (3048 mm)

Note: ASME A112.18.6/CSA B125.6 and CSA B125.5/IAPMO Z600 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
The change relocates all flexible water connectors, except 'water heater' connectors, but including corrugated connectors, into one section. It includes ASME A112.18.6/CSA B125.6, which also covers corrugated connectors.

The comment also removes the dubious statement “where under continuous pressure shall comply with...” as it is not needed.

The relocation of language will be helpful since water heater connectors are covered in Section 604.13.
PUBLIC COMMENT 3

Code Year: 2024 UPC  Section #: 604.5, 604.12  Item #: 140

SUBMITTER: Shane Peters  Self

RECOMMENDATION:
Revise text

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

604.0 Materials.

604.5 Flexible Connectors. Flexible water connectors shall be installed in readily accessible locations, and where under continuous pressure shall comply with ASME A112.18.6/CSA B125.6. Flexible water connectors with an excess flow shutoff device shall comply with CSA B125.5/IAPMO Z600.

604.12 Flexible Corrugated Water Connectors. Flexible water connectors shall comply with the following:
(1) Flexible corrugated connectors of copper, copper alloy, or stainless steel water connectors shall be installed in readily accessible locations, and shall comply with ASME A112.18.6/CSA B125.6.
(2) Flexible water connectors with an excess flow shutoff device shall comply with CSA B125.5/IAPMO Z600.
(3) Flexible water connectors shall be limited to the following connector lengths:
   (4a) Fixture Connectors – 30 inches (762 mm)
   (2b) Washing Machine Connectors – 72 inches (1829 mm)
   (6c) Dishwasher and Icemaker Connectors – 120 inches (3048 mm)

Note: ASME A112.18.6/CSA B125.6 and CSA B125.5/IAPMO Z600 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
The change relocates all flexible water connectors, except "water heater" connectors, but including corrugated connectors, into one section. It includes ASME A112.18.6/CSA B125.6, which also covers corrugated connectors.

The comment also removes the dubious statement "where under continuous pressure shall comply with..." as it is not needed.

The relocation of language will be helpful since water heater connectors are covered in Section 604.13.

PUBLIC COMMENT 4

Code Year: 2024 UPC  Section #: 604.5  Item #: 140

SUBMITTER: Karan Kapila  Self

RECOMMENDATION:
Revise text

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

604.0 Materials.

604.5 Flexible Connectors. Flexible water connectors shall be installed in readily accessible locations, and where under continuous pressure shall comply with ASME A112.18.6/CSA B125.6. Flexible water connectors with an excess flow shutoff device shall comply with CSA B125.5/IAPMO Z600.
SUBSTANTIATION:
The currently text is overly restrictive as there are times when such connectors are not “readily accessible.” There are many instances where a panel or door must be opened to access such connectors. For example, under sinks with cabinets. Opening a door to access the flexible water connector is considered “accessible” not “readily accessible.” This change will remove confusion in the field when these connectors are installed.

PUBLIC COMMENT 5
Code Year: 2024 UPC Section #: 604.5 Item #: 140
SUBMITTER: Shane Peters Self Comment #: 5
RECOMMENDATION:
Revise text
Request to replace the code change proposal by this public comment.

604.0 Materials.

604.5 Flexible Connectors. Flexible water connectors shall be installed in readily accessible locations, and where under continuous pressure shall comply with ASME A112.18.6/CSA B125.6. Flexible water connectors with an excess flow shutoff device shall comply with CSA B125.5/IAPMO Z600.

SUBSTANTIATION:
The language is being stricken since the connectors should comply with the standard whether they are under pressure or not under pressure.
Proposals

Item #: 141

UPC 2024 Section: 604.13

SUBMITTER: Lance MacNevin
Plastics Pipe Institute

RECOMMENDATION:
Revise text

604.0 Materials.

604.13 Water Heater Connectors. Flexible metallic (copper and stainless steel), reinforced flexible, braided stainless steel, or polymer braided with EPDM core connectors that connect a water heater to the piping system shall comply with ASME A112.18.6/CSA B125.6. Copper, copper alloy, or stainless steel flexible connectors shall not exceed 24 inches (610 mm). PEX, PEX-AL-PEX, PE-AL-PE, or PE-RT tubing shall not be installed within the first 18 inches (457 mm) of piping connected to a water heater.

Exception: PEX, PEX-AL-PEX, PE-AL-PE, or PE-RT tubing shall be permitted to be connected directly to tankless water heaters intended for domestic water applications.

SUBSTANTIATION:
PPI has conducted significant research on the topic of direct connection of plastic piping materials to tankless water heaters. The findings of the research were published in 2020 as "PPI Recommendation H: Direct Connection of Plastic Piping Materials to Tankless Water Heaters for Domestic (i.e. residential) Applications" published at https://plasticpipe.org/pdf/recommendation-h-direct-connection-tankless.pdf

The core findings are summarized in this paragraph: "Piping systems using the materials CPVC, PE-RT, PEX, and PP, which carry a pressure/ temperature rating of 100 psi at 180°F (690 kPa @ 82°C), and which are intended and certified for hot and cold potable water distribution systems according to industry standards and relevant codes, may be connected directly to tankless water heaters which are intended for domestic (i.e. residential) applications, unless prohibited by local plumbing code or the specific water heater manufacture."

Therefore, there is no reason to prohibit direction connection of these piping materials to tankless water heaters intended for domestic water applications. The proposed Exception will bring the UPC into harmonization with current industry practices which are supported in PPI Recommendation H.

The term "domestic" is well-established within this code. See definition for "Water Heater" in Chapter 2, Section 414.1, Section 609.12, and Table 610.3 as examples.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
There is a health and safety concern when allowing plastic materials to directly connect to a tankless water heater, therefore, the change is being rejected.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 604.13
Item #: 141

SUBMITTER: Lance MacNevin
Plastic Pipe Institute

Comment #: 1

RECOMMENDATION:
Revise text

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

604.0 Materials.

604.13 Water Heater Connectors. Flexible metallic (copper and stainless steel), reinforced flexible, braided stainless steel, or polymer braid with EPDM core connectors that connect a water heater to the piping system shall comply with ASME A112.18.6/CSA B125.6. Copper, copper alloy, or stainless steel flexible connectors shall not exceed 24 inches (610 mm). PEX, PEX-AL-PEX, PE-AL-PE, or PE-RT tubing shall not be installed within the first 18 inches (457 mm) of piping connected to a water heater.

Exception: PEX, PEX-AL-PEX, and PE-RT tubing shall be permitted to be connected directly to instantaneous water heaters intended for domestic water applications.

SUBSTANTIATION:
An earlier version of this proposal was Rejected by the TC in 2021. There were some suggestions for rewording provided in the TC hearing in May 2021.

The proposal has been reworded to use terminology consistent with the code. For example, the term “instantaneous” is used within Table 501.1(1) of the Code. The term “domestic” is used throughout the code (over 40 places).

Each of the piping materials listed in the proposed Exception are approved for potable water distribution. These materials are listed within Table 604.1 and are rated for operation of 100 psig at 180°F.

The three piping materials in the proposed Exception are safe for direct connection to instantaneous water heaters. Instantaneous water heaters do not produce the thermal stacking that is common in tank-type water heaters, and therefore, there is no reason to prohibit direction connection of these piping materials to instantaneous (tankless) water heaters intended for domestic water applications. The proposed Exception will bring the UPC into harmonization with current industry practices.

This proposal is supported by the 2020 publication PPI Recommendation H “Direct Connection of Plastic Piping Materials to Tankless Water Heaters for Domestic (i.e. residential) Applications” published at https://plasticpipe.org/pdf/recommendation-h-direct-connection-tankless.pdf

The Plastics Pipe Institute, Inc. (PPI) has conducted significant research on the topic of direct connection of plastic piping materials to instantaneous (also known as “tankless”) water heaters. This included the review of over 60 installation guides of instantaneous water heaters from 24 manufacturers supplying these appliances in the US.

The core findings of PPI’s research are summarized in this paragraph: “Piping systems using the materials CPVC, PE-RT, PEX, and PP, which carry a pressure/temperature rating of 100 psi at 180°F (690 kPa @ 82°C), and which are intended and certified for hot and cold potable water distribution systems according to industry standards and relevant codes, may be connected directly to tankless water heaters which are intended for domestic (i.e. residential) applications, unless prohibited by local plumbing code or the specific water heater manufacturer.”

[Supporting documentation provided in KAVI for TC review]
Proposals

Item #: 145
UPC 2024  Section: 605.2.2, 605.3.1, Table 1701.1, Table 1701.2

SUBMITTER: Michael Cudahy
PPFA

RECOMMENDATION:
Revise text

605.0 Joints and Connections.

605.2 CPVC Plastic Pipe and Joints. (remaining text unchanged)

605.2.2 Solvent Cement Joints. Solvent cement joints for CPVC pipe and fittings shall be clean from dirt and moisture. Solvent cements shall comply with ASTM F493, requiring the use of a primer shall be orange in color. The primer shall be colored and shall comply with ASTM F656. Listed solvent cement that complies with ASTM F493 and that does not require the use of primers, yellow or red in color, shall be permitted for pipe and fittings that comply with ASTM D2846, 1/2 of an inch (15 mm) through 2 inches (50 mm) in diameter or ASTM F442, 1/2 of an inch (15 mm) through 3 inches (80 mm) in diameter. Apply primer where required inside the fitting and to the depth of the fitting on pipe. Apply liberal coat of cement to the outside surface of pipe to depth of fitting and inside of fitting. Follow ASTM D2855 for two-step joining and ASTM F3328 for one-step joining. Place pipe inside fitting to forcefully bottom the pipe in the socket and hold together until joint is set.

605.3 CPVC/AL/CPVC Plastic Pipe and Joints. (remaining text unchanged)

605.3.1 Solvent Cement Joints. Solvent cement joints for CPVC/AL/CPVC pipe and fittings shall be clean from dirt and moisture. Solvent cements that comply with ASTM F493, requiring the use of a primer shall be orange in color. The primer shall be colored and shall comply with ASTM F656. Listed solvent cement that complies with ASTM F493 and that does not require the use of primers, yellow in color, shall be permitted to join pipe that comply with ASTM F2855 and fittings that comply with ASTM D2846, 1/2 of an inch (15 mm) through 2 inches (50 mm) in diameter. Apply primer where required inside the fitting and to the depth of the fitting on pipe. Apply liberal coat of cement to the outside surface of pipe to depth of fitting and inside of fitting. Follow ASTM D2855 for two-step joining and ASTM F3328 for one-step joining. Place pipe inside fitting to forcefully bottom the pipe in the socket and hold together until joint is set.
### TABLE 1701.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM D2855-2020</td>
<td>The Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets</td>
<td>Joints</td>
<td>605.2.2, 605.3.1</td>
</tr>
<tr>
<td>ASTM F3328-2018</td>
<td>The One-Step (Solvent Cement Only) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets</td>
<td>Joints</td>
<td>605.2.2, 605.3.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

**Note:** ASTM D2855 and ASTM F3328 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

### TABLE 1701.2
**STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM D2855-2015</td>
<td>Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets</td>
<td>Joints</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
There are two standards for solvent cement joining; ASTM D2855-15 is, “Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets” ASTM F3328-18 is, “Standard Practice for the One-Step (Solvent Cement Only) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.”

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**
The proposal is being rejected as the current code language provides the needed requirements regarding joining methods of CPVC and CPVC/AL/CPVC plastic pipe and joints.

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 21 NEGATIVE: 4 NOT RETURNED: 1 Daniels

**EXPLANATION OF NEGATIVE:**

**BALLANCO:** This change should have been accepted. The substantiation justifies the acceptance of this proposal.

**CUDAHY:** These are useful and extensive joining instructions.

**GORSUCH:** Agree with Charles White.

**WHITE:** The two methods should be accepted and standards included.

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Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 605.2.2, 605.3.1, Table 1701.1, Table 1701.2  Item #: 145

SUBMITTER: Michael Cudahy  Comment #: 1
PPFA

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
The standards explain the practice of making one- and two-step solvent welded joints in great detail and should be included in the code.
605.0 Joints and Connections.

605.12 PVC Plastic Pipe and Joints. PVC plastic pipe and fitting joining methods shall be installed in accordance with the manufacturer’s installation instructions and shall comply with Section 605.12.1 through Section 605.12.3. PVC piping shall not be exposed to direct sunlight.

**Exception:** Piping that is exposed to sunlight shall be unless the piping does not exceed 24 inches (610 mm) and is wrapped with not less than 0.04 of an inch (1.02 mm) thick tape or otherwise protected from UV degradation.

**SUBSTANTIATION:**
As written, the section on UV protection of PVC pipe and fittings is very confusing. The portion is being separated into its own section and re-written for clarity. There is no need to put a 24 inch limit as any exposed PVC pipe shall be protected. This change will clarify the intent of the section.

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**
The change will require all PVC piping that is exposed to sunlight to be wrapped, regardless of the length of pipe. Furthermore, there was no technical justification given to warrant such change.

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

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**PUBLIC COMMENT 1**

Code Year: 2024  UPC  Section #: 605.12  Item #: 146

SUBMITTER: Douglas Kirk  Self  Comment #: 1

RECOMMENDATION:
Revise text

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

605.0 Joints and Connections.

605.12 PVC Plastic Pipe and Joints. PVC plastic pipe and fitting joining methods shall be installed in accordance with the manufacturer’s installation instructions and shall comply with Section 605.12.1 through Section 605.12.3. PVC piping shall not be exposed to direct sunlight.
**Exception:** PVC piping in a location shall not be exposed to direct sunlight unless the piping does shall not exceed 24 inches (610 mm) in length and is be wrapped with not less than 0.04 of an inch (1.02 mm) thick UV resistant tape or otherwise protected from UV degradation.

**SUBSTANTIATION:**
The comment is rewriting Section 605.12 to make the requirements and limitations easier to understand.
Proposals

Item #: 147
UPC 2024  Section: 605.12.2, Table 1701.1

SUBMITTER: Michael Cudahy
PPFA

RECOMMENDATION:
Revise text

605.0 Joints and Connections.

605.12 PVC Plastic Pipe and Joints. (remaining text unchanged)

605.12.2 Solvent Cement Joints. Solvent cement joints for PVC pipe and fittings shall be clean from dirt and moisture. Pipe shall be cut square and pipe shall be deburred. Where surfaces to be joined are cleaned and free of dirt, moisture, oil, and other foreign material, apply primer purple in color that complies with ASTM F656. Primer shall be applied to the surface of the pipe and fitting is softened. Solvent cement that complies with ASTM D2564 shall be applied to all joint surfaces. Joints shall be made while both the inside socket surface and outside surface of pipe are wet with solvent cement. Two-step joining methods shall be in accordance with ASTM D2855. Hold joint in place and undisturbed for 1 minute after assembly.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM D2855-2020</td>
<td>Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets</td>
<td>Miscellaneous</td>
<td>605.12.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: ASTM D2855 meets the requirements for mandatory reference standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
The standard for solvent cement joining is ASTM D2855, “Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets”

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as the current code language provides the needed requirements regarding joining methods of PVC pipe and joints.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 20   NEGATIVE: 5   NOT RETURNED: 1   Daniels
EXPLANATION OF NEGATIVE:

BALLANCO: This change should have been accepted. The substantiation justifies the acceptance of the standard reference.

CUDAHY: These are useful and extensive joining instructions.

GORSUCH: Same as Item # 145, the substantiation justifies the change.

KREITENBERG: This modification provides better clarity of the requirement; should be accepted.

WHITE: This should be accepted based on the justification.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 605.12.2, Table 1701.1

SUBMITTER: Michael Cudahy
PPFA

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
The standard explains the practice of making two-step solvent welded joints in great detail and should be included in the code.
Proposals

Item #: 151
UPC 2024  Section: 218.0, 221.0, 605.17, Table 1701.1

SUBMITTER: Erin Coffman
Water Systems Council

RECOMMENDATION:
Add new text

605.0 Joints and Connections.

605.17 Pitless Adapters, Pitless Units, and Sanitary Well Caps for Potable Water Supply. Pitless adapters, pitless units, and sanitary well caps shall be installed in accordance with the manufacturer’s installation instructions and supported in accordance with the building code. Pitless adapters, pitless units, and sanitary well caps intended to supply drinking water shall comply with ASSE 1093/WSC PAS-97.

218.0 -P-

Pitless Adapter. A device designed to attach to one or more openings through a well casing. It shall be constructed so as to prevent the entrance of contaminants or pollutants into the well or potable water supply through such opening(s) to conduct water from the well, to protect the water from freezing or extremes of temperature, and to provide access to water system parts within the well.

Pitless Unit. An assembly that extends the upper end of the well casing from below the frostline to a minimum of 12 in (305 mm) above grade. It shall be constructed to prevent the entrance of contaminants or pollutants into the well or potable water supply, to conduct water from the well, to protect the water from freezing or extremes of temperature, and to provide full access to the well and to water system parts within the well. It shall provide a sanitary well cap for the top terminal of the well.

221.0 -S-

Sanitary Well Cap. A device that covers and encloses the upper termination of a pitless unit or the well casing and provides protection to the top, exposed portion of the well casing by being tamper resistant, forming a protective cover from the elements, that allows for atmospheric venting of the well, and being resistant to the entry of vermin or contaminants or pollutants.

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
<th>REFERENCED STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD NUMBER</td>
<td>STANDARD TITLE</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: ASSE 1093/WSC PAS 97 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.
SUBSTANTIATION:
The current code language does not provide requirements for pitless adapters, pitless units, and sanitary well caps. These are components that are critical to water well supply systems. Requirements are necessary for safety aspects and dependable performance standards.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The provisions involve capping of wells, which is not necessarily related to the scope of the plumbing code. Those regulations are specified by the health department.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 218.0, 602.4, 605.17, Table 1701.1 Item #: 151

SUBMITTER: Margaret Martens
Water Systems Council (WSC)

RECOMMENDATION:
Revise text

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

605.0 Joints and Connections.

605.17 Connections to Private Pitless Wells. Connections to private pitless wells intended to supply potable water shall be installed with an adapter that is in accordance with ASSE 1093/WSC PAS-97 and the manufacturer’s installation instructions.

218.0 -P-
Pitless Wells. Well assemblies constructed with a casing extending above ground surface with the water connection to the plumbing system below ground.

602.4 Approval by Authority. No water piping supplied by a private water supply system shall be connected to any other source of supply without the approval of the Authority Having Jurisdiction, Health Department, or other department having jurisdiction. Where approved, connections to private wells shall be in accordance with Section 605.17.

TABLE 1701.1

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
</table>

(portions of the table not shown remain unchanged)

Note: ASSE 1093/WSC PAS-97 meets the minimum requirements for mandatory referenced standards inaccordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
A common system for supplying potable water is a private water well. There are approximately 47 million people that are using private wells in the United States (U.S. Geological Survey). The UPC mentions private water supplies but is currently silent on any provisions or guidance for such systems.

Well pits are a common method of providing convenient access to lateral pipe connections below ground level on individual water systems. There is a health and safety concern for some unregulated systems because they can cause unsanitary conditions when not properly designed and can potentially be contaminated from near-surface sources that can drain into the pit.
Pitless wells are common replacements for above-ground well housing and well pits, improving sanitation, convenience, frost protection, and vandalism security. The ASSE 1093/WSC PAS-97 is and ANSI designated standard which guides the end user with pitless well construction and sharply reduces the possibility of contaminated water entering the well and system, allowing these systems to be more resilient to the surrounding.

The standard covers pitless adapters, pitless units, and sanitary well caps that are part of a pitless well system (See image below for example). These components are critical to well water supply systems as they protect the system's parts and potable water supply. The addition of the provisions in the proposed Section 605.17 (Connections to Private Wells) will give the end user and local jurisdictions minimum necessary requirements for safety aspects and dependable performance standards. Additionally, Section 602.4 (Approval by Authority) is needed to guide the end user to Section 605.17 for private wells where permitted by the local jurisdiction.
Proposals

Item #: 153
UPC 2024  Section: 606.1

SUBMITTER: David Mann
CA State Pipe Trades Council

RECOMMENDATION:
Revise text

606.0 Valves.
606.1 General. Valves up to and including 2 inches (50 mm) in size shall be copper alloy or other approved material. Sizes exceeding 2 inches (50 mm) shall be permitted to have cast iron or copper alloy bodies. Each gate or ball valve shall be a fullway or full-port type with working parts of the noncorrosive material. Valves carrying water used in potable water systems intended to supply drinking water shall comply with the requirements of NSF 61 and ASME A112.4.14, ASME B16.34, ASTM F1970, ASTM F2389, AWWA C500, AWWA C504, AWWA C507, IAPMO Z1157, MSS SP-67, MSS SP-70, MSS SP-71, MSS SP-72, MSS SP-78, MSS SP-80, MSS SP-110, MSS SP-122, or NSF 359. Valves intended to supply drinking water shall also comply with the requirements of NSF 61.

Note: NFPA 61 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
The revised text clarifies the intent of NSF 61 as only being required when the valves are used when the water is intended for drinking. All the other standards are required in potable water systems.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 606.1  Item #: 153

SUBMITTER: Kyle Thompson
Plumbing Manufacturers International (PMI)

RECOMMENDATION:
Revise text

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

606.0 Valves.

606.1 General. Valves up to and including 2 inches (50 mm) in size shall be copper alloy or other approved material. Sizes exceeding 2 inches (50 mm) shall be permitted to have bodies of cast iron, or copper alloy, or other approved materials-bodies. Each gate or ball valve shall be a fullway or full-port type with working parts of the noncorrosive material. Valves carrying water used in potable water systems shall comply with the requirements of ASME 112.4.14,
ASME B16.34, ASTM F1970, ASTM F2389, AWWA C500, AWWA C504, AWWA C507, IAPMO Z1157, MSS SP-67, MSS SP-70, MSS SP-71, MSS SP-72, MSS SP-78, MSS SP-80, MSS SP-110, MSS SP-122, or NSF 359. Valves intended to supply drinking water shall also comply with the requirements of NSF/ANSI/CAN 61.

**SUBSTANTIATION:**
Significant advancements in valve manufacturing and changes in material costs have occurred since the requirements that valve bodies exceeding 2 inches shall be permitted to have brass or cast-iron bodies were included in the code. Valves of this size are now routinely made of stainless steel and polymers. The material requirements for these valves are included in the product standards, that valves are required to comply with, referenced later in Section 606.1. For example: ASME A112.4.14 and IAPMO Z1157 cover valves up to NPS 4 and include material requirements for valve bodies made of Copper, Stainless Steel, and Polymeric Materials. ASTM F1970 and ASTM F2389 cover valves up to at least 6 in and include material requirements for valves made of polymeric materials.
Proposals

Item #: 157
UPC 2024  Section: 607.2, 607.2.1, 607.2.2, Table 1701.1

SUBMITTER: Erin Coffman
Water Systems Council

RECOMMENDATION:
Revise text

607.0 Potable Water Supply Tanks.

607.2 Potable Water Tanks. Potable water supply tanks, with and without bladders/diaphragms, interior tank coatings, or tank liners intended to supply drinking water shall comply with NSF 61.

607.2.1 Non-Pressurized Potable Water Tanks. Non-pressurized potable water tanks shall be tightly covered and vented in accordance with the manufacturer’s installation instructions. Such vent shall be screened with a corrosion-resistant material of not less than number 24 mesh. 607.4

Overflow: Tanks shall have an overflow not less than a 16 square inch (0.01 m²) overflow that is screened with a corrosion-resistant material of not less than number 24 mesh.

607.2.2 Pressurized Potable Water Tanks. Pressurized water tanks shall comply with ANSI/WSC PST 2000. A listed pressure-relief valve installed in accordance with the manufacturer’s installation instructions. The relief valve shall be discharged in accordance with 608.5. Where a potable water supply tank is located above the fixtures, appliances, or system components it serves, it shall be equipped with a vacuum relief valve that complies with CSA Z21.22.

(below shown for reference only)

608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
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<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSI/WSC PST 2000-2016</td>
<td>Performance Requirements for pressurized potable water storage tanks</td>
<td>Water Supply components</td>
<td>607.2.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: ANSI/WSC PST 2000 meets the requirements for a mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
The current code language does not provide requirements for pressurized potable water tanks. These are pressurized tanks are critical to water well supply systems. Requirements are necessary for safety aspects and dependable performance standards.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The text addresses one type of pressurized tank but does not address other types of pressured tanks that exist.
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 607.2, Table 1701.1  Item #: 157

SUBMITTER: Margaret Martens
Water Systems Council (WSC)  Comment #: 1

RECOMMENDATION:
Add new text

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

607.0 Potable Water Supply Tanks.
607.1 General. Potable water supply tanks shall be installed in accordance with the manufacturer’s installation instructions and supported in accordance with the building code.

607.2 Private Well Water Tanks. Pressurized potable water tanks for private well water systems shall comply with ASSE 1099/WSC-PST 2000.

607.2-607.3 Potable Water Tanks. Potable water supply tanks, interior tank coatings, or tank liners intended to supply drinking water shall comply with NSF/ANSI/CAN 61.

(renumber remaining sections)

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
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<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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</thead>
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<tr>
<td>ASSE 1099-2021/WSC PST 2000-2021</td>
<td>Pressurized Water Storage Tanks</td>
<td>Valves</td>
<td>603.5.21.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: ASSE 1099/WSC PST 2000 meets the requirements for a mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
The ASSE 1099/WSC-PST 2000 standard is an ANSI designated standard and is the version of the ANSI/WSC-PST 2000 standard that was originally submitted. The new revision is co-authored with WSC and ASSE.

A common system for supplying potable water is a private water well. There are approximately 47 million people are using private wells in the United States (U.S. Geological Survey). The UPC mentions private water supplies but is currently silent on any provisions or guidance for such systems. This standard prescribes minimum performance and construction requirements for pressurized storage tanks for service in water well systems. The added provisions will assist the installers and local jurisdictions to confirm that the tanks being installed are meeting minimum health and safety requirements.
PUBLIC COMMENT 2

Code Year: 2024 UPC  Section #: 607.3, 607.4  Item #: 157

SUBMITTER: Karan Kapila  Self  Comment #: 2

RECOMMENDATION:
Revise text

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

607.0 Potable Water Supply Tanks.

607.3 Venting. Non-pressurized Tanks used for potable water shall be tightly covered and vented in accordance with the manufacturer’s installation instructions. Such vent shall be screened with a corrosion-resistant material of not less than number 24 mesh.

607.4 Overflow. Non-pressurized Tanks shall have not less than a 16 square inch (0.01 m²) overflow that is screened with a corrosion-resistant material of not less than number 24 mesh.

SUBSTANTIATION:
The above change adds clarity to the existing text. Venting is only needed for non-pressurized tanks. Also overflows, they are not needed for pressurized tanks.
Proposals

Item #: 158
UPC 2024 Section: 608.2

SUBMITTER: Bob Gardner
Watts Water Technologies

RECOMMENDATION:
Revise text

608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.

608.2 Excessive Water Pressure. Where static water pressure in the water supply piping is exceeding 80 psi (552 kPa), an approved-type pressure regulator preceded by an adequate strainer shall be installed and the static pressure reduced to 80 psi (552 kPa) or less. Pressure regulators for potable water distribution systems shall comply with ASSE 1003 and NSF 61. Pressure regulator(s) equal to or exceeding 1 1/2 inches (40 mm) shall not require a strainer. For line sizes greater than 3 inches (80 mm), an automatic control (pressure regulating) valve shall be utilized. Such regulator(s) shall control the pressure to water outlets in the building unless otherwise approved by the Authority Having Jurisdiction. Each such regulator and strainer shall be accessibly located aboveground or in a vault equipped with a properly sized and sloped boresighted drain to daylight, shall be protected from freezing, and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping.

Pipe size determinations shall be based on 80 percent of the reduced pressure where using Table 610.4. An approved expansion tank shall be installed in the cold water distribution piping downstream of each such regulator to prevent excessive pressure from developing due to thermal expansion and to maintain the pressure setting of the regulator. Expansion tanks used in potable water systems intended to supply drinking water shall comply with NSF 61. The expansion tank shall be properly sized and installed in accordance with the manufacturer’s installation instructions and listing. Systems designed by registered design professionals shall be permitted to use approved pressure relief valves in lieu of expansion tanks provided such relief valves have a maximum pressure relief setting of 100 psi (689 kPa) or less.

Note: NSF 61 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
Adding of “and NSF 61” - For consistency purposes when stating the requirements for components being used in potable water distribution systems. Examples of this is Section 607.2 “Potable water supply tanks, interior tank coatings, or tank liners intended to supply drinking water shall comply with NSF 61” and “Expansion tanks used in potable water systems intended to supply drinking water shall comply with NSF 61,” also in Section 608.2.

Adding of “For line sizes greater than 3 inches, an automatic control (pressure regulating) valve shall be utilized.” – For line sizes 3 inches or larger, direct acting valves are not cost conducive nor the optimized device for this application. Where direct acting regulators will have volume losses and introduce a turbulent flow path, ACV’s will sustain volume more efficiently.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as it is overly restrictive by allowing pressure regulators larger than 3 inches. The requirements of ASSE 1003 and NSF 61 only apply to sizes up to 3 inches. There is a concern that the proposed language may conflict with the standards used for compliance.
TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

EXPLANATION OF AFFIRMATIVE:

SIGLER: Additional reasons why this proposed change should be rejected:
• There are direct-acting pressure regulating valves for supply lines larger than 3 inches that are currently being used successfully today. This change would eliminate that option.
• The justification that direct-acting pressure regulating valves are not cost-effective is wrong. The automatic control pressure regulating valves are more expensive than direct-acting pressure regulating valves.
• ASSE 1003 allows for direct-acting pressure regulating valves up to 4 inches in size.

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024  UPC  Section #: 608.2, Table 1701.1  Item #: 158
SUBMITTER: Chris B Haldiman
Watts Water Technologies

RECOMMENDATION:
Revise text

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

608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.

608.2 Excessive Water Pressure. Where static water pressure in the water supply piping is exceeding 80 psi (552 kPa), an approved-type pressure regulator preceded by an adequate strainer shall be installed and the static pressure reduced to 80 psi (552 kPa) or less. Pressure regulators for potable water distribution systems shall comply with ASSE 1003 or AWWA C530. Pressure regulator(s) equal to or exceeding 11/2 inches (40 mm) shall not require a strainer. Such regulator(s) shall control the pressure to water outlets in the building unless otherwise approved by the Authority Having Jurisdiction. Each such regulator and strainer shall be accessibly located aboveground or in a vault equipped with a properly sized and sloped boresighted drain to daylight, shall be protected from freezing, and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping.

Pipe size determinations shall be based on 80 percent of the reduced pressure where using Table 610.4.

An approved expansion tank shall be installed in the cold water distribution piping downstream of each such regulator to prevent excessive pressure from developing due to thermal expansion and to maintain the pressure setting of the regulator. Expansion tanks used in potable water systems intended to supply drinking water shall comply with NSF/ANSI/CAN 61. The expansion tank shall be properly sized, securely fastened to the structure, and installed in accordance with the manufacturer’s installation instructions and listing. Systems designed by registered design professionals shall be permitted to use approved pressure relief valves in lieu of expansion tanks provided such relief valves have a maximum pressure relief setting of 100 psi (689 kPa) or less.

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<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWWA C530-2017</td>
<td>Pilot-Operated Control Valves</td>
<td>Valves</td>
<td>608.2</td>
</tr>
</tbody>
</table>

(-portions of table not shown remain unchanged)

Note: AWWA C530 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
There are two types of water pressure reducing or controlling valves, direct acting and pilot operated. The 2021 Uniform Plumbing Code only allows the use of an ASSE 1003 compliant valve.
The current ASSE 1003 standard only includes sizes 1/2" - 4", which will meet the requirements of many buildings. However, there are occasions when sizes larger than 4" are needed to meet building water needs, and a AWWA C530 valve can accommodate the larger requirements as it includes 1-1/2” to 60” valves. Examples of buildings requiring flows larger than 4” could include large apartment buildings, hotels, factories and medical facilities.

Pilot operated control valves also provide a tighter control of the delivered water pressure, which may be desired in some building water systems. Adding AWWA C530 valves would allow design flexibility.

The primary thing to consider is that both valves accomplish the same function, reduce and control the building system water pressure if needed. By allowing the use of AWWA C530 Pilot Operated Control Valves system designers and AHJs would have the choice to use either, as well as being able to provide water pressure control for systems larger than the current maximum of 4".
Proposals

Item #: 159
UPC 2024  Section: 608.2 – 608.2.2

SUBMITTER: Shane Peters  
City of Santa Monica

RECOMMENDATION: 
Revise text

608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.

608.2 Excessive Water Pressure. Where static water pressure in the potable or nonpotable water supply piping is exceeding 80 psi (552 kPa), an approved-type pressure regulator preceded by an adequate strainer shall be installed and the downstream static pressure reduced to 80 psi (552 kPa) or less. Pressure regulators for potable water distribution systems shall comply with ASSE 1003. Pressure regulator(s) equal to or exceeding 1 ½ inches (40 mm) or more shall not require a strainer. Such regulator(s) shall control the pressure to water outlets in the building unless otherwise approved by the Authority Having Jurisdiction. Each such regulator and strainer shall be accessibly located aboveground or in a vault equipped with a properly sized and sloped beresighted drain to daylight, shall be protected from freezing, and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping.

Pipe size determinations shall be based on 80 percent of the reduced pressure where using Table 610.4.

608.2.1 Developed Length and Pressure Adjustments. When using Table 610.4, and a pressure regulator valve is required in the building supply, the developed length of supply piping shall be computed from the building side of that valve.

Available pressure determinations shall be based on 80 percent of the reduced pressure.

608.2.2 Expansion Tanks. An approved expansion tank shall be installed in the cold water distribution piping downstream of each such regulator to prevent excessive pressure from developing due to thermal expansion and to maintain the pressure setting of the regulator. Expansion tanks used in potable water systems intended to supply drinking water shall comply with NSF 61. The expansion tank shall be properly sized, and installed, and supported in accordance with the manufacturer’s installation instructions and listing.

Exception: Systems designed by a licensed plumbing contractor or registered design professionals shall be permitted to use approved pressure relief valves in lieu of expansion tanks provided such relief valves have a maximum pressure relief setting of 100 psi (689 kPa) or less.

(below shown for reference only)

| TABLE 610.4 |
| FIXTURE UNIT TABLE FOR DETERMINING WATER PIPE AND METER SIZES |
| (portions of table not shown remain unchanged) |

SUBSTANTIATION:
The proposed change reconfigured the existing Section 608.2 to group requirements together. Currently there is no specific requirement to control water pressure for non potable water supply piping. It seems that if it is required for potable water applications it should also be required for nonpotable use in Chapter 15 and 16.

Simplify, to make the section more readable; ‘1-1/2 inch or larger’ is simpler language.
The section on regulators is being stricken: Impossible in most installations. The pressure regulator can only 'control' the pressure of the water it discharges. Other factors such as thermal expansion can/will affect the water pressure downstream of the regulator. If the regulator was able to control the pressure to the water outlets, an expansion tank would not be required.

“Boresighted” is a term related to the optical alignment of a firearm, in this application it is practically impossible and is unnecessary language.

New section 608.2.1 replaces the previous one sentence paragraph. Adds language existing in Appendix A 107.2 while maintaining the 80% multiplier.

Further substantiation for new section 608.2.1 comes from UPC A & A Committee:
Q: To determine the building supply line using Table 610.4, the pressure range, max. length, and WSFU's are used to determine pipe size.
For this question, the data is: over 60, 100 feet, and 24 WSFU's demand.
A 3/4” meter with a 1” building supply is required.
If the supply line pressure is 110 psi and a pressure regulator is installed 40 feet from the meter and 60 feet from the “furthest outlet,” and reduced to 70 psi;

How does the language in section 608.2 (Pipe size determinations shall be based on 80 percent of the reduced pressure where using Table 610.4 apply?)

Where is the 20% reduction applied?
On the WSFU's?
On the supply line prior to the regulator?
After the regulator?

A: Per Section 608.2 of the 2012 UPC, “pipe size determinations shall be based on 80 percent of the reduced pressure when using Table 610.4.” If the reduced pressure at the pressure reducing valve is 70 psi the downstream piping from the PRV would be sized using Table 610.4 at 56 psi with “60 feet developed length to the furthest outlet.”

Then new section 608.2.2 (Expansion Tanks) breaks this portion into what is required, adding support language for expansion tanks and what is excepted.

The last change separates what is an exception to the previous languages, as an exception.

COMPANY ACTION: REJECT

COMPANY STATEMENT:
The proposed language is confusing because it integrates provisions for both potable and non-potable water. Additionally, the provided substantiation is insufficient in technical merit.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 608.2
SUBMITTER: Shane Peters Self
RECOMMENDATION: Revise text

Request to replace the code change proposal by this public comment.
608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.

608.2 Excessive Water Pressure. Where static water pressure in the water supply piping is exceeding 80 psi (552 kPa), an approved-type pressure regulator preceded by an adequate strainer shall be installed and the static pressure reduced to 80 psi (552 kPa) or less. Pressure regulator(s) equal to or exceeding 1-1/2 inches (40 mm) shall not require a strainer. Such regulator(s) shall control the pressure to water outlets in the building unless otherwise approved by the Authority Having Jurisdiction. Each such regulator and strainer shall be accessibly located aboveground or in a vault equipped with a properly sized and sloped boresighted drain to daylight, shall be protected from freezing, and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping.

Pipe size determinations shall be based on 80 percent of the reduced pressure where using Table 610.4.

608.2.1 Developed Length and Pressure Adjustment. When using Table 610.4, and a pressure regulator valve is required in the building supply, the developed length of supply piping shall be computed from the building side of the pressure regulator.

Available pressure determinations shall be based on 80 percent of the reduced pressure.

608.2.2 Expansion Tanks. An approved expansion tank shall be installed in the cold water distribution piping downstream of each such regulator to prevent excessive pressure from developing due to thermal expansion and to maintain the pressure setting of the regulator. Expansion tanks used in potable water systems intended to supply drinking water shall comply with NSF/ANSI/CSA 61. The expansion tank shall be properly sized, securely fastened to the structure, and installed in accordance with the manufacturer's installation instructions and listing.

Exception:
Systems designed by registered design professionals shall be permitted to use approved pressure relief valves in lieu of expansion tanks provided such relief valves have a maximum pressure relief setting of 100 psi (689 kPa) or less.

A 107.2 Pressure-Reducing Valves. Where a pressure reducing valve is used in the building supply, the developed length of supply piping and the permissible friction loss shall be computed from the building side of the valve.

SUBSTANTIATION:
New Section 608.2.1 replaces the previous one-sentence paragraph. The proposed change adds the language existing in Appendix A, Section A 107.2 (Pressure-Reducing Valve) while maintaining the 80% multiplier.

The question of how this is applied is asked frequently and it is believed this will simplify and clarify it's application.

Adding a new section 608.2.2 (Expansion Tanks) puts the requirement for and installation of expansion tanks in it's own section.

The added exception separates what is in fact an exception.
Each such regulator and strainer shall be accessibly located aboveground or in a vault equipped with a properly sized and sloped boresighted drain to daylight, shall be protected from freezing, and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping.

Pipe size determinations shall be based on 80 percent of the reduced pressure where using Table 610.4.

An approved expansion tank shall be installed in the cold water distribution piping downstream of each such regulator to prevent **excessive pressure exceeding 80 psi** from developing due to thermal expansion and to maintain the pressure setting of the regulator. Expansion tanks used in potable water systems intended to supply drinking water shall comply with NSF 61. The expansion tank shall be properly sized and installed in accordance with the manufacturer’s installation instructions and listing. Systems designed by registered design professionals shall be permitted to use approved pressure relief valves in lieu of expansion tanks provided such relief valves have a maximum pressure relief setting of 100 psi (689 kPa) or less.

**SUBSTANTIATION:**

The term excessive is not defined and tying the pressure to the regulators is just as problematic. Regulators are typically set at 50 PSI when sold, and can be adjusted up or down from there.

Previously, the pressure not to exceed was established at 80 PSI. Controlling pressure increases caused by thermal expansion should begin at the same value for consistency.

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**PUBLIC COMMENT 3**

**Code Year:** 2024 **UPC Section #:** 608.2

**SUBMITTER:** Shane Peters **Self**

**Item #:** 159 **Comment #:** 3

**RECOMMENDATION:**

Revise text

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

608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.

608.2 Excessive Water Pressure. Where static water pressure in the water supply piping is exceeding 80 psi (552 kPa), an approved-type pressure regulator preceded by an adequate strainer shall be installed and the static pressure reduced to 80 psi (552 kPa) or less. Pressure regulator(s) 1-1/2 inches (40 mm) shall not require a strainer. Such regulator(s) shall control the pressure to water outlets in the building unless otherwise approved by the Authority Having Jurisdiction. Each such regulator and strainer shall be accessibly located aboveground or in a vault equipped with a properly sized and sloped boresighted drain to daylight, shall be protected from freezing, and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping.

Pipe size determinations shall be based on 80 percent of the reduced pressure where using Table 610.4.

An approved expansion tank shall be installed in the cold water distribution piping downstream of each such regulator to prevent excessive pressure from developing due to thermal expansion and to maintain the pressure setting of the regulator. Expansion tanks used in potable water systems intended to supply drinking water shall comply with NSF 61 ANSI/CAN. The expansion tank shall be properly sized, securely fastened to the structure, and installed in accordance with the manufacturer’s installation instructions and listing. Systems designed by registered design professionals shall be permitted to use approved pressure relief valves in lieu of expansion tanks provided such relief valves have a maximum pressure relief setting of 100 psi (689 kPa) or less.

**SUBSTANTIATION:**

The original substantiation submitted by Mike Wynne from August 2004 stated in part: “Section 608.2 sets 80 psi as the maximum pressure in the building. The wording that follows, however, does nothing to ensure that the 80 psi is not exceeded by the forces of thermal expansion…….”

The sentence is being stricken as the pressure regulator can only ‘control’ the pressure of the water when passing through the regulator. Other factors such as thermal expansion can/will affect the water pressure downstream of the regulator. If the regulator was able to control the pressure to the water outlets, an expansion tank would not be required.
PUBLIC COMMENT 4

Code Year: 2024 UPC  Section #: 608.2  Item #: 159
SUBMITTER: Shane Peters  Self  Comment #: 4

RECOMMENDATION:
Revise text

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

608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.

608.2 Excessive Water Pressure. Where static water pressure in the potable or nonpotable water supply piping is exceeding 80 psi (552 kPa), an approved-type pressure regulator preceded by an adequate strainer shall be installed and the downstream static pressure reduced to 80 psi (552 kPa) or less. Pressure regulator(s) equal to or exceeding 1-1/2 inches (40 mm) or larger shall not require a strainer. Such regulator(s) shall control the pressure to water outlets in the building unless otherwise approved by the Authority Having Jurisdiction. Each such regulator and strainer shall be accessibly located aboveground or in a vault equipped with a properly sized and sloped drain to daylight, shall be protected from freezing, and shall have the strainer readily accessible for cleaning without removing the regulator or strainer body or disconnecting the supply piping.

Pipe size determinations shall be based on 80 percent of the reduced pressure where using Table 610.4.

An approved expansion tank shall be installed in the cold water distribution piping downstream of each such regulator to prevent excessive pressure from developing due to thermal expansion and to maintain the pressure setting of the regulator.

An approved expansion tanks used in potable water systems intended to supply drinking water shall comply with NSF/ANSI/CAN 61. The expansion tank shall be properly sized, securely fastened to the structure, and installed in accordance with the manufacturer’s installation instructions and listing. Systems designed by a licensed plumbing contractor or registered design professionals shall be permitted to use approved pressure relief valves in lieu of expansion tanks provided such relief valves have a maximum pressure relief setting of 100 psi (689 kPa) or less.

SUBSTANTIATION:
1. Replace "the" with "potable or nonpotable." Currently there is no specific requirement to control water pressure for nonpotable water supply piping. It seems that if it is required for potable water applications it should also be required for nonpotable use in chapters 15 and 16.
2. Replace "is exceeding" with "exceeds" to simplify the language and make it more readable.
3. Using "1-1/2 inch or larger" is easier language to understand & Manual of Style which matches other portions of the language.
4. The term is being stricken as "boresighted" is a term related to the optical alignment of a firearm, in this application, it is practically impossible and is unnecessary language.
5. The phrase "licensed plumbing contractor" is being added as the exact phrase is used in sections 1501.2 and Section 1601.2.
608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.

608.7 Vacuum Relief Valves. Where the elevation of an entire hot-water storage tank or an indirect water heater is located at an elevation above the fixture outlets in the hot-water system, a vacuum relief valve that complies with CSA Z21.22 shall be installed on the storage tank or heater. Exception: Storage tanks which have an internal anti-siphon port in their fill tube shall not be required to install a vacuum relief valve.

SUBSTANTIATION:
Introducing air to the interior of a dip tube will "break" a siphon in all cases. Water heaters with anti-siphon ports in the top of their dip tubes are not subject to siphonage. Storage tanks which have an indirect heat source (a heat exchanger within the storage tank, or hot water circulated from the heat source to the storage tank) may or may not have an internal means of preventing siphonage. Those which are not designed or installed in a manner which specifically prevents siphonage shall be provided with a vacuum relief valve to provide the necessary anti-siphon protection. When any configuration of piping or tank design and installation could result in potential siphoning of the tanks contents, an appropriate vacuum relief valve must be installed as instructed by the manufacturer.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed language on vacuum relief valves is confusing and not clear as to when the exception would apply. Additionally, the reference to the "elevation of the entire water heater" above the fixture outlets is confusing and not technically justified.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 608.7

SUBMITTER: Douglas Kirk
Self

RECOMMENDATION:
Revise text

Request to replace the code change proposal by this public comment.
608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.

608.7 Vacuum Relief Valves. Where a hot-water storage tank or an indirect water heater is located at an elevation above the fixture outlets in the hot-water system, a vacuum relief valve that complies with CSA Z21.22 shall be installed on the storage tank or indirect water heater.

**Exception:** Hot water storage tanks or storage type water heaters which have an internal antisiphon port in their dip tube shall not be required to be equipped with a vacuum relief valve.

**SUBSTANTIATION:**
The proposed change adds language to prevent unnecessary installation of Anti-Siphon equipment where it is not required.

This section is vague and ambiguous because it is easy to make this section require more than it is intended for.

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

Item #: 163
UPC 2024  Section: 609.8.3

**SUBMITTER:** David D Dexter, P.E.
3D Engineering Consultants, LLC

**RECOMMENDATION:**
Revise text

609.8 Pumps. Pumps shall be installed in accordance with the manufacturer's installation instructions.

609.8.1 Access. Pumps shall be accessible for repairs.

609.8.2 Potable Water Pumps. Pumps intended to supply drinking water shall be in accordance with NSF 61.

609.8.3 Hot-Water Recirculating Pumps. For hospitals, custodial care facilities, hotels, or motels, devices that automatically turn off the recirculation pump(s) shall not be utilized.

**SUBSTANTIATION:**
- Given the concern for Legionella risk mitigation in facilities where there are higher potentials to immuno-compromised person or persons with pre-existing condition, the current health care design advice is to maintain circulation along with a temperature above the growth range for pathogen growth.
- ASHRAE 188 recommends continuous circulation of the water system as part of a good water management program.
- OSHA Technical Manual, Section III, Chapter 7, V. Controls, 3, c states: Domestic hot-water recirculation pumps should run continuously. They should be excluded from energy conservation measures.
- JCAHO (Joint Commission on Accreditation of Healthcare Organizations) mandate that covered organizations follow the OSHA requirements
- VA (Veterans Administration) provides similar mandates to minimize Legionella risks.
- CMS (Centers for Medicare & Medicaid Services) provides similar mandates to minimize Legionella risks.

Therefore, it is in the best interest of public health, safety and welfare to provide this revision to the minimum requirements of the code as a way to comply with the requirements of other authorities and in the interest of mitigating the risk of Legionella as well as other potential pathogens within the water system

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**
Hotel and motel occupancies should not be included in the proposed section as the infirm do not always occupy these locations. The proposed language is not enforceable as there is no means of monitoring this after initial inspection. These requirements should be left to the local jurisdictions. Additionally, this change will eliminate the use of circulating pumps with timers that are currently in use.

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 21  NEGATIVE: 4  NOT RETURNED: 1  Daniels

**EXPLANATION OF NEGATIVE:**

**BALLANCO:** I think this is an important issue that has been supported by the healthcare profession. The change should have been accepted to prevent any growth in hot water piping in healthcare facilities. Similar health concerns are also present in hotels and motels. Experience has shown extensive growth on the interior of hot water piping in hotels and motels when the recirculation is permitted to shut down during periods of low use.

**GORSUCH:** Agree with all the comments from negative votes. Hotels and motels perhaps are more problematic due to lack of regulations. The first Legionella outbreak happened in a hotel and many others to follow.
MATA: The proponent has provided adequate justification as to why this proposal is needed. However, any needed revisions will be made at public comment.

WHITE: The proponent's substantiation justifies adopting this change.

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**Appended Comments**

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**PUBLIC COMMENT 1**

<table>
<thead>
<tr>
<th>Code Year:</th>
<th>2024 UPC</th>
<th>Section #: 609.8.3</th>
<th>SUBMITTER:</th>
<th>David D. Dexter, PE</th>
<th>Comment #: 1</th>
</tr>
</thead>
</table>

**RECOMMENDATION:**
Add new text

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

**609.8 Pumps.** Pumps shall be installed in accordance with the manufacturer's installation instructions.

**609.8.1 Access.** Pumps shall be accessible for repairs.

**609.8.2 Potable Water Pumps.** Pumps intended to supply drinking water shall be in accordance with NSF/ANSI/CAN 61.

**609.8.3 Hot-Water Recirculating Pumps.** For healthcare facilities, long term care facilities, hotels, or motels, devices that automatically turn off the recirculation pump(s) shall not be required.

**SUBSTANTIATION:**
Hotels after healthcare facilities has the highest incidence rate of Legionnaires' Disease and thus need to be included in this list. The IECC 2015, 2018, and 2021 requires aquastats and timers on ALL hot water recirculation pumps. Aquastats and timers can cause temperature stagnation of hot water systems which can lead to proliferation of waterborne pathogens and directly conflicts with NASEM Management of Legionella in Buildings, OSHA Technical Manual, ASHRAE 188, ASHRAE 12, among others. By indicating that the aquastats and timers "shall not be required" engineers, installers, and owners have the option to design, install, and operate hot water return systems in a manner that minimizes the risk of waterborne pathogen outbreaks, thus positively impacting public health and safety. Local jurisdictions that have adopted any version of IECC 2015 or later now have provisions that increase the risk of a health issue stemming from the hot water return system. Numerous engineers have unsuccessfully argued this point with local jurisdictions which is why this exception language is needed. By adding this exception language to the code, jurisdictions can better work with engineers, installers, and owners and become more aligned to the latest science in regards to hot water safety.
Proposals

Item #: 165

UPC 2024  Section: Table 610.3

SUBMITTER: Lance MacNevin
Plastics Pipe Institute

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>APPLIANCES, APPURTENANCES OR FIXTURES²</th>
<th>MINIMUM FIXTURE BRANCH PIPE SIZE¹,₄ (inches)</th>
<th>PRIVATE</th>
<th>PUBLIC</th>
<th>ASSEMBLY⁶</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathtub or Combination</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathtub/Shower (fill)³</td>
<td>¹/₂</td>
<td>4.0</td>
<td>4.0</td>
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</tr>
<tr>
<td>³/₄ inch Bathtub Fill Valve</td>
<td>³/₄</td>
<td>10.0</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>Bidet</td>
<td>¹/₂</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothes Washer</td>
<td>¹/₂</td>
<td>4.0</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Dental Unit, cuspidor</td>
<td>¹/₂</td>
<td></td>
<td>1.0</td>
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</tr>
<tr>
<td>Dishwasher, domestic³</td>
<td>¹/₂</td>
<td>1.5</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Drinking Fountain or Water Cooler</td>
<td>¹/₂</td>
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<td>0.5</td>
<td>0.75</td>
</tr>
<tr>
<td>Hose Bibb</td>
<td>¹/₂</td>
<td>2.5</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Hose Bibb, each additional⁸</td>
<td>¹/₂</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Lavatory⁹</td>
<td>¹/₂</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
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<tr>
<td>Lawn Sprinkler, each head⁵</td>
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<td>1.0</td>
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<tr>
<td>Mobile Home, each (minimum)</td>
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<td>12.0</td>
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<td></td>
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<tr>
<td>Sinks</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Bar⁹</td>
<td>¹/₂</td>
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<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Clinical Faucet</td>
<td>¹/₂</td>
<td>—</td>
<td>3.0</td>
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<tr>
<td>Clinical Flushometer Valve with or without faucet</td>
<td>1</td>
<td>—</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Kitchen, domestic with or without dishwasher⁹</td>
<td>¹/₂</td>
<td>1.5</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Laundry⁹</td>
<td>¹/₂</td>
<td>1.5</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Service or Mop Basin⁹</td>
<td>¹/₂</td>
<td>1.5</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Washup, each set of faucets²</td>
<td>¹/₂</td>
<td>—</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Shower, per head³</td>
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<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Urinal, 1.0 GPF Flushometer</td>
<td>³/₄</td>
<td>See Footnote⁷</td>
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<td></td>
</tr>
</tbody>
</table>
Valve

<table>
<thead>
<tr>
<th>Fixture Description</th>
<th>Size</th>
<th>Flow Rate</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinal, greater than 1.0 GPF Flushometer Valve</td>
<td>3/4</td>
<td>See Footnote 7</td>
<td>—</td>
</tr>
<tr>
<td>Urinal, flush tank</td>
<td>1/2</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Urinal with Drain Cleansing Action</td>
<td>1/2</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Wash Fountain, circular spray</td>
<td>3/4</td>
<td>—</td>
<td>4.0</td>
</tr>
<tr>
<td>Water Closet, 1.6 GPF Gravity Tank</td>
<td>1/2</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Water Closet, 1.6 GPF Flushometer Tank</td>
<td>1/2</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Water Closet, 1.6 GPF Flushometer Valve</td>
<td>1</td>
<td>See Footnote 7</td>
<td>—</td>
</tr>
<tr>
<td>Water Closet, greater than 1.6 GPF Gravity Tank</td>
<td>1/2</td>
<td>3.0</td>
<td>5.5</td>
</tr>
<tr>
<td>Water Closet, greater than 1.6 GPF Flushometer Valve</td>
<td>1</td>
<td>See Footnote 7</td>
<td>—</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm

Notes:
1 Size of the cold branch pipe, or both the hot and cold branch pipes.
2 Appliances, appurtenances, or fixtures not referenced in this table shall be permitted to be sized by reference to fixtures having a similar flow rate and frequency of use.
3 The listed fixture unit values represent their load on the cold water building supply. The separate cold water and hot water fixture unit value for fixtures having both hot and cold water connections shall be permitted to be each taken as three-quarter of the listed total value of the fixture.
4 The listed minimum supply branch pipe sizes for individual fixtures are the nominal (I.D.) pipe size.
5 For fixtures or supply connections likely to impose continuous flow demands, determine the required flow in gallons per minute (gpm) (L/s), and add it separately to the demand in gpm (L/s) for the distribution system or portions thereof.
6 Assembly [Public Use (See Table 422.1)].
7 Where sizing flushometer systems, see Section 610.10.
8 Reduced fixture unit loading for additional hose bibbs is to be used where sizing total building demand and for pipe sizing where more than one hose bibb is supplied by a segment of water distribution pipe. The fixture branch to each hose bibb shall be sized on the basis of 2.5 fixture units.
9 Nominal tubing size 3/8 inch (10 mm) shall be permitted to be used where hydraulic calculations support the use of this size.

Substantiation:
Many of the appliances, appurtenances or fixtures which are currently approved for use are subject to water conservation regulations which reduce their WSFU demand, and therefore their required supply pipe sizing. The twelve (12) specific Appliances, Appurtenances or Fixtures to which footnote 9 is proposed to be added meet this description.

Plumbing system designers should have the option to supply these appliances, appurtenances or fixtures with NTS 3/8 tubing, where supported by hydraulic calculations which demonstrate sufficient flow and pressure supply. This will assist with conservation of water, as 3/8 tubing has approximately half the volume of 1/2 tubing, so hot-water fixtures will require less flushing of water before hot water arrives. The addition of footnote 9 as proposed is independent of the tubing material.

Committee Action: Reject

Committee Statement:
The proposed language may cause a water pressure issue, as well as clogging of the fixtures. There is also a concern with adequate filling of bathtubs and water closets. No technical justification was provided to justify such change.

Total Eligible to Vote: 26
VOTING RESULTS:  AFFIRMATIVE: 19  NEGATIVE: 6  NOT RETURNED: 1  Daniels

EXPLANATION OF AFFIRMATIVE:

GORSUCH: I think 3/8 of an inch piping shall only be allowed for very low flow fixtures such as a public lavatory. I have a concern about a mineral buildup (many parts of the country have hard water) that will clog piping that after several years of the initial construction, the systems will need to be re-piped to address the water pressure issue.

EXPLANATION OF NEGATIVE:

BALLANCO: This change was properly substantiated. Tubing 3/8 of an inch in diameter has been used throughout the country without incident.

BROWN, CUDAHY, WHITE: Agree with Ramiro Mata.

MATA: The rejection stating, “no technical justification was provided” does not seem to make sense since the proposal clearly stated, “where hydraulic calculations support its use.” Additionally, 3/8 of an inch is just an option, not mandated.

SIGLER: Agree with Ramiro Mata. This proposal should have been approved as the need for 3/8 inch supply piping has been supported in studies conducted by Gary Klein and others in order to efficiently deliver water to low-flow plumbing fixtures and fittings.

APPENDED COMMENTS

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Table 610.3  Item #: 165

SUBMITTER: Lance MacNevin
Plastic Pipe Institute  Comment #: 1

RECOMMENDATION:
Revise text

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

<table>
<thead>
<tr>
<th>APPLIANCES, APPURtenances or Fixtures</th>
<th>MINIMUM FIXTURE BRANCH PIPE SIZE1,4 (inches)</th>
<th>PRIVATE</th>
<th>PUBLIC</th>
<th>ASSEMBLY6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathtub or Combination Bath/Shower (fill)</td>
<td>1/2</td>
<td>4.0</td>
<td>4.0</td>
<td>—</td>
</tr>
<tr>
<td>3/4 inch Bathtub Fill Valve</td>
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<td>10.0</td>
<td>10.0</td>
<td>—</td>
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<tr>
<td>Bidet</td>
<td>1/2</td>
<td>1.0</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Clothes Washer</td>
<td>1/2</td>
<td>—</td>
<td>1.0</td>
<td>—</td>
</tr>
<tr>
<td>Dental Unit, cuspidor</td>
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<td>1.0</td>
<td>—</td>
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<td>Dishwasher, domestic</td>
<td>1/2</td>
<td>1.5</td>
<td>1.5</td>
<td>—</td>
</tr>
<tr>
<td>Drinking Fountain or Water Cooler</td>
<td>1/2</td>
<td>0.5</td>
<td>0.5</td>
<td>0.75</td>
</tr>
<tr>
<td>Hose Bibb</td>
<td>1/2</td>
<td>2.5</td>
<td>2.5</td>
<td>—</td>
</tr>
<tr>
<td>Hose Bibb, each additional</td>
<td>1/2</td>
<td>1.0</td>
<td>1.0</td>
<td>—</td>
</tr>
<tr>
<td>Lavatory</td>
<td>1/2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Lawn Sprinkler, each head</td>
<td>—</td>
<td>1.0</td>
<td>1.0</td>
<td>—</td>
</tr>
</tbody>
</table>
### Mobile Home, each (minimum)

<table>
<thead>
<tr>
<th>Component</th>
<th>Supply Branch Pipe Diameter</th>
<th>GPM</th>
<th>WSFU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinks</td>
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<tr>
<td>Bar</td>
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<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Clinical Faucet</td>
<td>1/2</td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>Clinical Flushometer Valve with or without faucet</td>
<td>1</td>
<td></td>
<td>8.0</td>
</tr>
<tr>
<td>Kitchen, domestic with or without dishwasher</td>
<td>1/2</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Laundry</td>
<td>1/2</td>
<td>1.5</td>
<td>1.5</td>
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<tr>
<td>Service or Mop Basin</td>
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<td>3.0</td>
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<tr>
<td>Washup, each set of faucets</td>
<td>1/2</td>
<td></td>
<td>2.0</td>
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<tr>
<td>Shower, per head</td>
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<td>2.0</td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Urinal, greater than 1.0 GPF Flushometer Valve</td>
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<td></td>
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<td>Urinal with Drain Cleansing Action</td>
<td>1/2</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Wash Fountain, circular spray</td>
<td>3/4</td>
<td></td>
<td>4.0</td>
</tr>
<tr>
<td>Water Closet, 1.6 GPF Gravity Tank</td>
<td>1/2</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Water Closet, 1.6 GPF Flushometer Tank</td>
<td>1/2</td>
<td>2.5</td>
<td>2.5</td>
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<tr>
<td>Water Closet, 1.6 GPF Flushometer Valve</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Water Closet, greater than 1.6 GPF Gravity Tank</td>
<td>1/2</td>
<td>3.0</td>
<td>5.5</td>
</tr>
<tr>
<td>Water Closet, greater than 1.6 GPF Flushometer Valve</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm

### Notes:

1. Size of the cold branch pipe, or both the hot and cold branch pipes.
2. Appliances, appurtenances, or fixtures not referenced in this table shall be permitted to be sized by reference to fixtures having a similar flow rate and frequency of use.
3. The listed fixture unit values represent their load on the cold water building supply. The separate cold water and hot water fixture unit value for fixtures having both hot and cold water connections shall be permitted to be each taken as three-quarter of the listed total value of the fixture.
4. The listed minimum supply branch pipe sizes for individual fixtures are the nominal (I.D.) pipe size.
5. For fixtures or supply connections likely to impose continuous flow demands, determine the required flow in gallons per minute (gpm) (L/s), and add it separately to the demand in gpm (L/s) for the distribution system or portions thereof.
6. Assembly [Public Use (See Table 422.1)].
7. Where sizing flushometer systems, see Section 610.10.
8. Reduced fixture unit loading for additional hose bibbs is to be used where sizing total building demand and for pipe sizing where more than one hose bibb is supplied by a segment of water distribution pipe. The fixture branch to each hose bibb shall be sized on the basis of 2.5 fixture units.
9. Nominal tubing size 3/8 inch (10 mm) shall be permitted to be used where hydraulic calculations as described in Appendix A support the use of this pipe size.

### SUBSTANTIATION:

Recent research has been published by multiple organizations including IAPMO regarding the oversizing of water distribution pipes when following Hunter’s Curve and historical pipe sizing tables. New information such as that found within Appendix M "Peak Water Demand Calculator" of the Code indicates that water distribution pipes are often oversized for the flow rates allowed by many current fixtures. Oversized pipes can lead to stagnant water and the potential health risk of Legionella growth, as well as greater water usage when flushing hot water lines, wasting water and energy, while many areas of the Western United States are facing extreme drought conditions.

Many of the Appliances, Appurtenances or Fixtures which are currently approved for use are subject to water conservation regulations which reduce their WSFU demand, and therefore their required supply pipe sizing. The six (6) specific Appliances, Appurtenances or Fixtures to which footnote 9 is proposed to be added meet this description.
A previous version of this proposal, which would have added a different version of Footnote 9 to twelve (12) Appliances, Appurtenances or Fixtures, was Rejected by the TC in May 2021. The TC’s concerns about the time to fill certain fixtures were recognized, and those fixtures have been removed from this proposal. The TC also requested clarified language in the proposed Footnote 9, which has been reworded to clarify that “hydraulic calculations” are found within Appendix A.

Plumbing system designers should have the option to supply these Appliances, Appurtenances or Fixtures with NTS 3/8 tubing where supported by hydraulic calculations which demonstrate sufficient flow and pressure supply. This will assist with conservation of water, because 3/8 tubing has approximately half the volume of 1/2 tubing, so hot-water fixtures will require less flushing of water before hot water arrives. The addition of Footnote 9 applies to all approved piping materials.

This public comment proposal recognizes that Section 610.5 allows that “Except as provided in Section 610.4, the size of each water piping system shall be determined in accordance with the procedure set forth in Appendix A.”

A separate public comment is being submitted to revise Table A103.1 in the same way for consistency throughout the Code.

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**PUBLIC COMMENT 2**

**Code Year:** 2024 UPC  **Section #:** Table A 103.1  **Item #:** 165

**SUBMITTER:** Lance MacNevin  
Plastic Pipe Institute  **Comment #:** 2

**RECOMMENDATION:**
Revise text

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

---

**TABLE A 103.1**

**WATER SUPPLY FIXTURE UNITS (WSFU) AND MINIMUM FIXTURE BRANCH PIPE SIZES**

<table>
<thead>
<tr>
<th>APPLIANCES, APPURTENANCES OR FIXTURES²</th>
<th>MINIMUM FIXTURE BRANCH PIPE SIZE³¹,⁴ (inches)</th>
<th>PRIVATE</th>
<th>PUBLIC</th>
<th>ASSEMBLY⁶</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathtub or Combination Bath/Shower (fill)</td>
<td>1/2</td>
<td>4.0</td>
<td>4.0</td>
<td>–</td>
</tr>
<tr>
<td>3/4 inch Bathtub Fill Valve</td>
<td>3/4</td>
<td>10.0</td>
<td>10.0</td>
<td>–</td>
</tr>
<tr>
<td>Bidet³⁸</td>
<td>1/2</td>
<td>1.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Clothes Washer</td>
<td>1/2</td>
<td>4.0</td>
<td>4.0</td>
<td>–</td>
</tr>
<tr>
<td>Dental Unit, cuspidor</td>
<td>1/2</td>
<td>–</td>
<td>1.0</td>
<td>–</td>
</tr>
<tr>
<td>Dishwasher, domestic³⁸</td>
<td>1/2</td>
<td>1.5</td>
<td>1.5</td>
<td>–</td>
</tr>
<tr>
<td>Drinking Fountain or Water Cooler</td>
<td>1/2</td>
<td>0.5</td>
<td>0.5</td>
<td>0.75</td>
</tr>
<tr>
<td>Hose Bibb</td>
<td>1/2</td>
<td>2.5</td>
<td>2.5</td>
<td>–</td>
</tr>
<tr>
<td>Hose Bibb, each additional⁷</td>
<td>1/2</td>
<td>1.0</td>
<td>1.0</td>
<td>–</td>
</tr>
<tr>
<td>Lavatory³⁸</td>
<td>1/2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Lawn Sprinkler, each head⁵</td>
<td>–</td>
<td>1.0</td>
<td>1.0</td>
<td>–</td>
</tr>
<tr>
<td>Mobile Home, each (minimum)</td>
<td>–</td>
<td>12.0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Sinks</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Bar³⁸</td>
<td>1/2</td>
<td>1.0</td>
<td>2.0</td>
<td>–</td>
</tr>
<tr>
<td>Scenario</td>
<td>Size</td>
<td>Hot</td>
<td>Cold</td>
<td>Total</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------</td>
<td>-----</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>Clinical Faucet</td>
<td>1/2</td>
<td>-</td>
<td>-</td>
<td>3.0</td>
</tr>
<tr>
<td>Clinical Flushometer Valve with or without faucet</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>8.0</td>
</tr>
<tr>
<td>Kitchen, domestic with or without dishwasher</td>
<td>1/2</td>
<td>1.5</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>Laundry</td>
<td>1/2</td>
<td>1.5</td>
<td>1.5</td>
<td>-</td>
</tr>
<tr>
<td>Service or Mop Basin</td>
<td>1/2</td>
<td>1.5</td>
<td>-</td>
<td>3.0</td>
</tr>
<tr>
<td>Washup, each set of faucets</td>
<td>1/2</td>
<td>-</td>
<td>-</td>
<td>2.0</td>
</tr>
<tr>
<td>Shower per head</td>
<td>1/2</td>
<td>2.0</td>
<td>-</td>
<td>2.0</td>
</tr>
<tr>
<td>Urinal, 1.0 GPF Flushometer Valve</td>
<td>3/4</td>
<td>3.0</td>
<td>-</td>
<td>4.0</td>
</tr>
<tr>
<td>Urinal, greater than 1.0 GPF Flushometer Valve</td>
<td>3/4</td>
<td>4.0</td>
<td>-</td>
<td>5.0</td>
</tr>
<tr>
<td>Urinal, flush tank</td>
<td>1/2</td>
<td>2.0</td>
<td>-</td>
<td>2.0</td>
</tr>
<tr>
<td>Wash Fountain, circular spray</td>
<td>3/4</td>
<td>-</td>
<td>-</td>
<td>4.0</td>
</tr>
<tr>
<td>Water Closet, 1.6 GPF Gravity Tank</td>
<td>1/2</td>
<td>2.5</td>
<td>2.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Water Closet, 1.6 GPF Flushometer Tank</td>
<td>1/2</td>
<td>2.5</td>
<td>2.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Water Closet, greater than 1.6 GPF Gravity Tank</td>
<td>1</td>
<td>5.0</td>
<td>5.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Water Closet, greater than 1.6 GPF Flushometer Valve</td>
<td>1/2</td>
<td>3.0</td>
<td>5.5</td>
<td>7.0</td>
</tr>
<tr>
<td>Water Closet</td>
<td>1</td>
<td>7.0</td>
<td>8.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm

Notes:
1. Size of the cold branch pipe, or both the hot and cold branch pipes.
2. Appliances, appurtenances, or fixtures not included in this table shall be permitted to be sized by reference to fixtures having a similar flow rate and frequency of use.
3. The listed fixture unit values represent their total load on the cold water building supply. The separate cold water and hot water fixture unit value for fixtures having both cold and hot water connections shall be permitted to be three-quarters of the listed total value of the fixture.
4. The listed minimum supply branch pipe sizes for individual fixtures are the nominal (I.D.) pipe size.
5. For fixtures or supply connections likely to impose continuous flow demands, determine the required flow in gallons per minute (gpm) (L/s) and add it separately to the demand in gpm (L/s) for the distribution system or portions thereof.
6. Assembly [Public Use (see Table 422.1)].
7. Reduced fixture unit loading for additional hose bibbs is to be used where sizing total building demand and for pipe sizing where more than one hose bibb is supplied by a segment of water distribution pipe. The fixture branch to each hose bibb shall be sized by 2.5 fixture units.
8. Nominal tubing size 3/8 inch (10 mm) shall be permitted to be used where hydraulic calculations as described in this appendix supports the use of this pipe size.

SUBSTANTIATION:
This proposal is complementary to the proposal to Revise Table 610.3 for consistency throughout the Code.

Recent research has been published by multiple organizations including IAPMO regarding the oversizing of water distribution pipes when following Hunter’s Curve and historical pipe sizing tables. New information such as that found within Appendix M “Peak Water Demand Calculator” of the Code indicates that water distribution pipes are often oversized for the flow rates allowed by many current fixtures. Oversized pipes can lead to stagnant water and the potential health risk of Legionella growth, as well as greater water usage when flushing hot water lines, wasting water and energy, while many areas of the Western United States are facing extreme drought conditions.

Many of the Appliances, Appurtenances or Fixtures which are currently approved for use are subject to water conservation regulations which reduce their WSFU demand, and therefore their required supply pipe sizing. The six (6) specific Appliances, Appurtenances or Fixtures to which footnote 9 is proposed to be added meet this description.
Plumbing system designers should have the option to supply these Appliances, Appurtenances or Fixtures with NTS 3/8 tubing where supported by hydraulic calculations which demonstrate sufficient flow and pressure supply. This will assist with conservation of water, because 3/8 tubing has approximately half the volume of 1/2 tubing, so hot-water fixtures will require less flushing of water before hot water arrives. The addition of Footnote 8 applies to all approved piping materials.

This public comment proposal recognizes that Section 610.5 allows that “Except as provided in Section 610.4, the size of each water piping system shall be determined in accordance with the procedure set forth in Appendix A.”

A separate public comment has been submitted to revise Table 610.3 in the same way for consistency throughout the Code.
Proposals

Item #: 168
UPC 2024  Section: Table 701.2, Table 1701.1

SUBMITTER: William E Chapin
Professional Code Consulting, LLC

RECOMMENDATION:
Revise text

TABLE 701.2
MATERIALS FOR DRAIN, WASTE, VENT PIPE AND FITTINGS

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>UNDERGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS</th>
<th>ABOVEGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS</th>
<th>BUILDING SEWER PIPE AND FITTINGS</th>
<th>REFERENCED STANDARD(S) PIPE</th>
<th>REFERENCED STANDARD(S) FITTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyethylene</td>
<td>--</td>
<td>--</td>
<td>X</td>
<td>ASTM F714, ASTM F894</td>
<td>--</td>
</tr>
<tr>
<td>Polyolefin</td>
<td>X</td>
<td>X</td>
<td>--</td>
<td>ASTM F3371</td>
<td>ASTM F3371</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

TABLE 1701.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM F3371-2019</td>
<td>Polyolefin Pipe and Fittings for Drainage, Waste, and Vent Applications</td>
<td>Piping</td>
<td>Table 701.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: ASTM F3371 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
ASTM F3371 was developed and published as it includes the same requirements as ASTM F1412 minus the chemical resistance testing. Also, note that other ASTM standards for drain, waste, and vent (DWV) application do not include a chemical resistance test. Under the scope of ASTM F3371, two polyolefins materials are covered; polyethylene (PE) and polypropylene (PP).

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The scope of the standard is vague and does adequately address waste system piping requirements.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Table 701.2, Table 1701.1  Item #: 168

SUBMITTER: William Chapin
Professional Code Consulting, LLC  Comment #: 1

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
Request to approve the proposed change as originally submitted.

The last part of the Committee Statement reads that the standard "does adequately address waste system requirements." The first part of the statement was that the scope was vague, which may be the reason for rejection, however the scope is identical to ASTM F1412, which is already listed in the UPC. The only difference in the two standards is the change from corrosive waste to DWV systems. Due to technical issues, we were not able to address this properly during the online versions of meetings last year despite the best efforts of staff to accommodate our issues.
Proposals

Item #: 170
UPC 2024 Section: Table 701.2

SUBMITTER: John Grieco
PPI Pyungwha Co., LTD

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>UNDERGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS</th>
<th>ABOVEGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS</th>
<th>BUILDING SEWER PIPE AND FITTINGS</th>
<th>REFERENCED STANDARD(S) PIPE</th>
<th>REFERENCED STANDARD(S) FITTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polypropylene</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM F1412, CSA B181.3</td>
<td>ASTM F1412, CSA B181.3</td>
</tr>
</tbody>
</table>

* For building sewer applications.

(portions of the table not shown remain unchanged)

Note: ASTM F1412 and CSA B181.3 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
Polypropylene is used in the industry. The proposed polypropylene standards are currently in Section 811.12 (Waste and Vent Pipes) for corrosive or acidic fluid. Waste fluids can be corrosive, so such piping would be appropriate for Chapter 7.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed provisions are better suited in Chapter 8 where pipe is intended for acid or corrosive chemical waste.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024 UPC Section #: 701.2
SUBMITTER: Marcus Min
PPI America, INC

RECOMMENDATION:
Revise text

Request to accept the code change proposal as submitted by this public comment.
Polypropylene (PP) Materials have been used for Drain, Waste, and Vent Pipe and Fittings, both pressure and non-pressure, throughout the industry and not exclusively or only for corrosive waste and chemical fluids as currently referenced in Chapter 8.

Polypropylene (PP) should be accepted in Chapter 7 as it pertains to water drainage as indicated in the ASTM F3371 scope which covers requirements for non-pressure propylene pipe and fittings for drainage, waste, and vent applications as well as in the ASTM F2389 scope which covers requirements for polypropylene (PP) piping system components made to metric sizes and IPS schedule 80 sizes, and pressure rated for water service and distribution supply. Included are criteria for materials, workmanship, dimensions and tolerances, product tests, and marking for polypropylene (PP) piping system components such as pipe, fittings, valves, and manifolds.

There are other agencies in product evaluation and certification that are currently listing non-pressure polypropylene (PP) or polyethylene (PE) pipes and fittings as well as pressure rated polypropylene (PP) for use in drainage, waste, and vent (DWV) applications to the ASTM Standard F3371 and ASTM Standard F2389 respectively.

In 2014 the new California Plumbing Code (CPC), polypropylene (PP) pipe material listed for building potable water supply and distribution, the referenced standard(s) for piping and fittings are ASTM F 2389 and CSA B137.11.

Additionally, in Section 605.12 the CPC states, “PP pipe and fittings shall be installed in accordance with the manufacturer’s installation instructions and shall comply with Section 605.12.1 through Section 605.12.3.” These sections include: Section 605.12.1 which discusses heat-fusion joints, Section 605.12.2 which discusses mechanical and compression sleeve joints and Section 605.12.2 which discusses threaded joints.

Polypropylene (PP) also certified by NSF: NSF/ANSI 14 – Plastics Piping System Components and Related Materials (for all pressure applications), NSF/ANSI/CAN 61 - Drinking Water System Components - Health Effects (for potable water applications), and NSF/ANSI 372 - Drinking Water System Components – Lead Content (for potable water applications).

PP materials manufactured in accordance with these ASTM standards have been successfully installed and used in numerous Marriott Hotel Developments throughout Asia, Toyoko Hotel Corporation in Japan, Hard Rock Hotel Casinos in Florida, US Bank Stadium which is home of the NFL Minnesota Vikings, and numerous US Universities are upgrading all their plumbing to PP including the University of Idaho, University of Florida, and Utah State University to name a few.

As you can see Polypropylene (PP) materials are commonly accepted and applied within the utilities industry and should be written in and accepted into Chapter 7 of the UPC.
### TABLE 701.2

**MATERIALS FOR DRAIN, WASTE, VENT PIPE**

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>UNDERGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS</th>
<th>ABOVEGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS</th>
<th>BUILDING SEWER PIPE AND FITTINGS</th>
<th>REFERENCED STANDARD(S) PIPE</th>
<th>REFERENCED STANDARD(S) FITTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS (Schedule 40)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM D2661, ASTM D2680&lt;sup&gt;1&lt;/sup&gt;</td>
<td>ASME A112.4.4, ASTM D2661, ASTM D2680&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Co-Extruded Composite (Schedule 40)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM F628</td>
<td>ASME A112.4.4, ASTM D2661, ASTM D2680&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Co-Extruded PVC (Schedule 40)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM F891, ASTM F1760</td>
<td>ASME A112.4.4, ASTM D2661, ASTM D2680&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Polyethylene</td>
<td>---</td>
<td>---</td>
<td>X</td>
<td>ASTM F714, ASTM F894, ASTM F2306&lt;sup&gt;2&lt;/sup&gt;</td>
<td>ASTM F3202</td>
</tr>
<tr>
<td>Polypropylene</td>
<td>=</td>
<td>=</td>
<td>X</td>
<td>ASTM F2764, ASTM F2881&lt;sup&gt;2&lt;/sup&gt;</td>
<td>ASTM F3202</td>
</tr>
<tr>
<td>PVC (Schedule 40)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM D1785, ASTM D2665, ASTM F794&lt;sup&gt;1&lt;/sup&gt;</td>
<td>ASME A112.4.4, ASTM D2665, ASTM F794&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Reinforced Concrete Pipe</td>
<td>=</td>
<td>=</td>
<td>X</td>
<td>ASTM C76</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. For building sewer applications.
2. For building storm sewer applications.

(portions of table not shown remain unchanged)

705.0 Joints and Connections.
705.5 Polyethylene (PE) Sewer Pipe and Joints. Polyethylene (PE) sewer pipe or tubing and fitting joining methods shall be installed in accordance with the manufacturer’s installation instructions and shall comply with Section 705.5.1 through Section 705.5.1.3-705.5.2.
705.5.2 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint type. The push-on joint shall include an elastomeric gasket that complies with ASTM D3212 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

705.9 Polypropylene Pipe and Joints. Joining methods for polypropylene pipe and fittings shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 705.9.1.

705.9.1 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint type. The push-on joint shall include an elastomeric gasket that complies with ASTM D3212 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

705.10 Reinforced Concrete Pipe and Joints. Joining methods for reinforced concrete pipe shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 705.10.1.

705.10.1 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint type. The push-on joint shall include an elastomeric gasket that complies with ASTM C1628 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

705.11 Special Joints. (remaining text unchanged)

705.12 Joints Between Various Materials. (remaining text unchanged)

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**TABLE 1701.1**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM C76-2020</td>
<td>Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe</td>
<td>Building Sewer</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM C1628-2019</td>
<td>Joints for Concrete Gravity Flow Sewer Pipe, Using Rubber Gaskets</td>
<td>Building Sewer</td>
<td>705.10</td>
</tr>
<tr>
<td>ASTM F2306/F2306M-2020</td>
<td>12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications</td>
<td>Building Storm Sewer</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM F2764/F2764M-2019</td>
<td>6 to 60 in. [150 to 1500 mm] Polypropylene (PP) Corrugated Double and Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications</td>
<td>Building Sewer</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM F2881/F2881M-2019</td>
<td>12 to 60 in. [300 to 1500 mm] Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications</td>
<td>Building Storm Sewer</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM F3202-2019a</td>
<td>Solid Wall Poly (Vinyl Chloride) PVC Fittings for Joining Corrugated Wall High Density Polyethylene (PE) and Polypropylene (PP) Piping</td>
<td>Building Sewer</td>
<td>Table 701.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**Note:** ASTM C76, ASTM C1628, ASTM D3212, ASTM F2306, ASTM F2764, ASTM F2881, and ASTM F3202 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

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**TABLE 1701.2**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM F2306/F2306M-2018</td>
<td>12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications</td>
<td>Piping, Plastic</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)
SUBSTANTIATION:
State plumbing boards and their inspectors adopting the UPC are restricting the use of the most common large
diameter, gravity flow storm sewer materials in the marketplace. When table 701.2 for building sewer is applied all
the way to the property line for larger developments and institutions, this greatly increases the cost for conveying
storm water collected all over the site to the public sewer. Currently, many professional engineers are having to
request alternate approval for all of these materials on every project they design because of the application of Table
701.2 to the property line. I am proposing adding the most common storm sewer materials in the US for use as
building storm sewer pipe to Table 701.2 in order to alleviate that concern and restriction. Since submitting this last
time, I have included language for joints/connections for all materials and proper fittings for materials as well which
was the primary objection in the 2021 code cycle.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
Reinforced Concrete Pipe (RCP) and flex piping are inappropriate for maintaining slope in sanitary sewer
applications.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024 UPC Section #: Table 701.2, 705.5, 705.5.2, 705.9 – 705.10,
Table 1701.1, Table 1701.2 Item #: 171
SUBMITTER: Riley Dvorak
Forterra

RECOMMENDATION:
Revise text

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

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>UNDERGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS</th>
<th>ABOVEGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS</th>
<th>BUILDING SEWER PIPE AND FITTINGS</th>
<th>REFERENCED STANDARD(S) PIPE</th>
<th>REFERENCED STANDARD(S) FITTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS (Schedule 40)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM D2661, ASTM D2680*</td>
<td>ASME A112.4.4, ASTM D2661, ASTM D2680*</td>
</tr>
<tr>
<td>Co-Extruded Composite (Schedule 40)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM F628</td>
<td>ASME A112.4.4, ASTM D2661, ASTM D2680*</td>
</tr>
<tr>
<td>Co-Extruded PVC (Schedule 40)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM F891, ASTM F1760</td>
<td>ASME A112.4.4, ASTM D2661, ASTM D2685, ASTM F794*, ASTM F1866</td>
</tr>
<tr>
<td>Polyethylene</td>
<td>---</td>
<td>---</td>
<td>X</td>
<td>ASTM F714, ASTM F894, ASTM F2306</td>
<td>ASTMD3202</td>
</tr>
<tr>
<td>Polypropylene</td>
<td>---</td>
<td>---</td>
<td>X</td>
<td>ASTM F2764, ASTM F2881</td>
<td>ASTMD3202</td>
</tr>
</tbody>
</table>
705.0 Joints and Connections.
705.5 Polyethylene (PE) Sewer Pipe and Joints. Polyethylene (PE) sewer pipe or tubing and fitting joining methods shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 705.5.1 through Section 705.5.5.2.

705.5.2 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint type. The push-on joint shall include an elastomeric gasket that complies with ASTM D3212 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

705.9 Polypropylene Pipe and Joints. Joining methods for polypropylene pipe and fittings shall be installed in accordance with the manufacturer's installation instructions and comply with Section 705.9.1.

705.9.1 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint type. The push-on joint shall include an elastomeric gasket that complies with ASTM D3212 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

705.10 Reinforced Concrete Pipe and Joints. Joining methods for reinforced concrete pipe shall be installed in accordance with the manufacturer's installation instructions and shall comply with Section 705.10.1.

705.10.1 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint type. The push-on joint shall include an elastomeric gasket that complies with ASTM C443 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

705.11 Special Joints. (remaining text unchanged)

705.12 Joints Between Various Materials. (remaining text unchanged)

TABLE 1701.1 
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM C76-2020</td>
<td>Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe</td>
<td>Building Sewer</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM C443-2021</td>
<td>Joints for Concrete Pipe and Manholes, Using Rubber Gaskets</td>
<td>Building Sewer</td>
<td>705.10.1</td>
</tr>
<tr>
<td>ASTM F2306/F2306M-2021</td>
<td>300 to 1500 mm [12 in. to 60 in.] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Non-Pressure Gravity-Flow Storm Sewer and Subsurface Drainage Applications</td>
<td>Building Storm Sewer</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM F2764/F2764M-2019</td>
<td>6 to 60 in. [150 to 1500 mm] Polypropylene (PP) Corrugated Double and Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications</td>
<td>Building Sewer</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM F2881/F2881M-2021e1</td>
<td>12 to 60 in. [300 to 1500 mm] Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications</td>
<td>Building Storm Sewer</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM F3202-2019a</td>
<td>Solid Wall Poly. (Vinyl Chloride) PVC Fittings for Joining Corrugated Wall High Density Polyethylene (PE) and Polypropylene (PP) Piping</td>
<td>Building Sewer</td>
<td>Table 701.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)
<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM C443-2020</td>
<td>Joints for Concrete Pipe and Manholes, Using Rubber Gaskets</td>
<td>Fittings</td>
</tr>
<tr>
<td>ASTM F2306/F2306M-2018</td>
<td>12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm-Sewer and Subsurface Drainage Applications</td>
<td>Piping, Plastic</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
These common storm sewer pipe materials should be included in this table because sections 1104.3, 1104.4, and 1105.5 for storm sewers all reference this table for allowable pipe materials.

This item was initially rejected due to a misunderstanding of the intent of the proposal. The note at the bottom of the table has been revised to more clearly signify that these added products are ONLY intended for use in storm sewer applications and are not applicable for sanitary sewers. The note "2" has also been added to ASTM C76 Reinforced Concrete Pipe as it was mistakenly left off of the original proposal.

Additionally, the included joint standard for RCP (originally ASTM C1628) has been revised to a more universal storm sewer joint (ASTM C443). Recommend accepting as revised.
Proposals

Item #: 173
UPC 2024  Section: Table 701.2, Table 1701.1

SUBMITTER: Robert D. Ryan
Exact Fit Inc

RECOMMENDATION:
Revise text

TABLE 701.2
MATERIALS FOR DRAIN, WASTE, VENT PIPE AND FITTINGS

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>UNDERGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS</th>
<th>ABOVEGROUND DRAIN, WASTE, VENT PIPE AND FITTINGS</th>
<th>BUILDING SEWER PIPE AND FITTINGS</th>
<th>REFERENCED STANDARD(S) PIPE</th>
<th>REFERENCED STANDARD(S) FITTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS (Schedule 40)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM D2661, ASTM D2680*</td>
<td>ASME A112.4.4, ASTM D2661, ASTM D2680*, IAPMO IGC 342</td>
</tr>
<tr>
<td>PVC (Schedule 40)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM D1785, ASTM D2665, ASTM F794*</td>
<td>ASME A112.4.4, ASTM D2665, ASTM F794*, ASTM F1866, IAPMO IGC 342</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

TABLE 1701.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 342-2018</td>
<td>ABS and PVC Snap-Lock DWV Fittings</td>
<td>Fittings</td>
<td>Table 701.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO IGC 342 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
The DWV couplings covered by IAPMO IGC 342, ABS and PVC Snap-Lock DWV Fittings address the difficulty faced when repairing and/or replacing a section of DWV pipe that is stationary, immobile, and/or buried. In a typical scenario (movable pipes), the repair would be accomplished through creative methods to insert rigid couplings on both ends using a proper solvent cement (ASTM D2661, ASTM D2665, ASTM D2680, ASTM F794, and ASTM...
F1866). In the scenario where pipes are stationary, immobile or buried, creative methods used are the combination of a rigid coupling on one end and a flexible coupling on the other end (ASTM C1173) or the use of a flexible coupling on both ends.

Use of fittings covered under IAMO IGC 342 will allow this same repair/replacement to be completed with a pipe measured to exactly fit the section of pipe that was removed, with the proper use of solvent cements (ASTM D2235, ASTM D2564, ASTM F656) (same as the typical scenario for movable pipes), and with or without the said creative methods to complete the immobile or buried installation.

This proposal is intended to include reference to IGC 342 in the code to allow another option to addressing the repair and replacement of ABS and PVC drainpipe for use of Snap-Lock DWV Fittings in addition to those already covered by the existing references.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed standard is for repairs and not for new installations. This goes beyond the minimum requirements of the code.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Table 701.2  Item #: 173

SUBMITTER: Robert Douglas Ryan
Exact Fit Inc
Rep. Power Plumbing Inc

Comment #: 1

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
The Technical Committee was concerned with the terms repair and repairing and the intent of the standard. However, the DWV coupling covered by IAPMO IGC 342 is a solvent weld fitting for installation and that once "installed" is a permanent fitting. I have updated the original substantiation to clarify that these fittings are for any installations.

The DWV couplings covered by IAPMO IGC 342, ABS and PVC Snap-Lock DWV Fittings address the difficulty faced when installing and/or replacing a section of DWV pipe that is stationary, immobile, and/or buried. In a typical scenario (movable pipes), the install would be accomplished through creative methods to insert rigid coupleings on both ends using a proper solvent cement (ASTM D2661, ASTM D2665, ASTM D2680, ASTM F794, and ASTM F1866). In the scenario where pipes are stationary, immobile or buried, creative methods used are the combination of a rigid coupling on one end and a flexible coupling on the other end (ASTM C1173) or the use of a flexible coupling on both ends.

Use of fittings covered under IAMO IGC 342 will allow this same installation/replacement to be completed with a pipe measured to exactly fit the section of pipe that was removed, with the proper use of solvent cements (ASTM D2235, ASTM D2564, ASTM F656) (same as the typical scenario for movable pipes), and with or without the said creative methods to complete the immobile or buried installation.

This proposal is intended to include reference to IGC 342 in the code to allow another option to addressing the installation and replacement of ABS and PVC drainpipe for use of Snap-Lock DWV Fittings in addition to those already covered by the existing references.
204.0 -B- Bathroom Group. Any combination of fixtures, not to exceed one water closet, two lavatories, either one bathtub or one combination bath/shower, and one shower, and may include a bidet and an emergency floor drain.

Half Group. A group of fixtures located together for use by a single occupant consisting of a water closet and lavatory.

702.0 Fixture Unit Equivalents.

702.1 Trap Size. The unit equivalent of plumbing fixtures shown in Table 702.1 shall be based on the size of the trap required, and the unit equivalent of fixtures and devices not shown in Table 702.1 shall be based on the size of trap or trap arm.

Maximum drainage fixture units for a fixture trap and trap arm loadings for sizes up to 4 inches (100 mm) shall be in accordance with Table 702.1(1).

<table>
<thead>
<tr>
<th>PLUMBING APPLIANCES, APPURTENANCES, OR FIXTURES</th>
<th>MINIMUM SIZE TRAP AND TRAP ARM² (inches)</th>
<th>PRIVATE</th>
<th>PUBLIC</th>
<th>PUBLIC ASSEMBLY²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathroom Group (1.6 gpf or less water closet)</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Half Group</td>
<td>5</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>1 Bathroom Group</td>
<td>6</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>1-1/2 Bathroom Groups</td>
<td>5</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>2 Bathroom Groups</td>
<td>7</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>2-1/2 Bathroom Groups</td>
<td>8</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>3 Bathroom Groups</td>
<td>9</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Each Additional Half Groups</td>
<td>0.5</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Each Additional Bathroom Groups</td>
<td>1</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Bathroom Group (Greater than 1.6 gpf water closet)</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Half Group</td>
<td>6</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>1 Bathroom Group</td>
<td>8</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>1-1/2 Bathroom Groups</td>
<td>8</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>2 Bathroom Groups</td>
<td>10</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>2-1/2 Bathroom Groups</td>
<td>11</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>3 Bathroom Groups</td>
<td>12</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Each Additional Half Groups</td>
<td>0.5</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Each Additional Bathroom Groups</td>
<td>1</td>
<td>3.5</td>
<td>0.5</td>
<td>1</td>
</tr>
</tbody>
</table>
For SI units: 1 inch = 25 mm

Notes:
1. Indirect waste receptors shall be sized based on the total drainage capacity of the fixtures that drain thereinto, in accordance with Table 702.2.
2. Provide a 2 inch (50 mm) minimum drain.
3. For refrigerators, coffee urns, water stations, and similar low demands.
4. For commercial sinks, dishwashers, and similar moderate or heavy demands.
5. Buildings having a clothes-washing area with clothes washers in a battery of three or more clothes washers shall be rated at 6 fixture units each for purposes of sizing common horizontal and vertical drainage piping.
6. Water closets shall be computed as 6 fixture units where determining septic tank sizes based on Appendix H of this code.
7. Trap sizes shall not be increased to the point where the fixture discharge is capable of being inadequate to maintain their self-scouring properties.
8. Assembly [Public Use (see Table 422.1)].
9. For a bathtub to shower retrofit, a 1-1/2 inch (40 mm) trap and trap arm shall be permitted with a maximum shower size of 36 inches (914 mm) in width and 60 inches (1524 mm) in length. See Section 408.5 and Section 408.6.

SUBSTANTIATION:
This change adds a new definition of bathroom group and half bath. These two definitions allow a new category of fixtures to be added to the drainage fixture unit table. Tom Konen, P.E. did extensive research on the impact of flows in the overall drainage systems design using low flow fixtures. The proposed new table of fixture unit values was published in 1994. Konen identified in his paper is that families are getting smaller and houses are getting bigger with more bathrooms. Using the queuing theory developed by Dr. Roy B. Hunter, Konen determined that the use of fixtures varies based on the number of fixture installed in a dwelling unit. A five bathroom home occupied by 3 people could not possibly have a peak demand whereby half of the fixture are used simultaneously. Konen's data identified the frequency of use. The data resulted in a revised fixture unit table for bathroom groups. This table has been included in the IAPMO National Standard Plumbing Code since the publication of Konen's paper. To date, I am unaware of the information being proposed to the UPC. This will add the accepted practice of lowering the fixture unit value for bathroom groups.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The provided definition is not necessary as the intent is already covered in the existing definition for "half bathroom group." Additionally, the research does not adequately support the insertion of bathroom groups in the Drainage Fixture Unit Values (DFU) table.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 21 NEGATIVE: 3 ABSTAIN: 1 NOT RETURNED: 1 Daniels

EXPLANATION OF NEGATIVE:

GORSUCH: I agree with Charles White.

SOSKIN: Low flow fixtures have difficulty with self-cleaning and self-scouring.

WHITE: I believe the submitted substantiation supports approving this proposal.

EXPLANATION OF ABSTAIN:

BALLANCO: I am abstaining since I am the proponent of this code change. I believe the research clearly substantiates the change in the fixture unit values.
PUBLIC COMMENT 1

Item #: 175

Code Year: 2024 UPC  Section #: Table C 303.2, Table C 303.3

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:

Revise text

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

### TABLE C 303.2

**WATER SUPPLY FIXTURE UNITS (WSFU) FOR BATHROOM GROUPS**

<table>
<thead>
<tr>
<th></th>
<th>PRIVATE USE BATHROOM GROUP</th>
<th>SERVING 3 OR MORE PRIVATE USE BATHROOM GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>COLD</td>
<td>HOT³</td>
</tr>
<tr>
<td>Bathroom Groups Having up to 1.6 GPF Gravity-Tank and Pressure Tank Water Closets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Half-Bath or Powder Room</td>
<td>3.5</td>
<td>0.8</td>
</tr>
<tr>
<td>1 Bathroom Group</td>
<td>5.0</td>
<td>2.5</td>
</tr>
<tr>
<td>1 1/2 Bathrooms</td>
<td>6.0</td>
<td>2.5</td>
</tr>
<tr>
<td>2 Bathrooms</td>
<td>7.0</td>
<td>3.5</td>
</tr>
<tr>
<td>2 1/2 Bathrooms</td>
<td>8.0</td>
<td>3.6</td>
</tr>
<tr>
<td>3 Bathrooms</td>
<td>9.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Each Additional 1/2 Bath</td>
<td>0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Each Additional Bathroom Group</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Bathroom Groups Having up to 1.6 GPF Pressure-Tank Water Closets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Half-Bath or Powder Room</td>
<td>3.5</td>
<td>0.8</td>
</tr>
<tr>
<td>1-Bathroom-Group</td>
<td>5.0</td>
<td>2.5</td>
</tr>
<tr>
<td>1 1/2 Bathrooms</td>
<td>6.0</td>
<td>2.5</td>
</tr>
<tr>
<td>2 Bathrooms</td>
<td>7.0</td>
<td>3.5</td>
</tr>
<tr>
<td>2 1/2 Bathrooms</td>
<td>8.0</td>
<td>3.6</td>
</tr>
<tr>
<td>3 Bathrooms</td>
<td>9.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Each Additional 1/2 Bath</td>
<td>0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>Each Additional Bathroom Group</td>
<td>1.0</td>
<td>0.5</td>
</tr>
</tbody>
</table>

### OTHER GROUPS OF FIXTURES

|                                | PRIVATE USE BATHROOM GROUP | SERVING 3 OR MORE PRIVATE USE BATHROOM GROUP |
|                                | COLD  | HOT³ | COLD | HOT |
| Bathroom Group (1.6 GPF Flusher Value) | 6.0   | 2.5  | 4.0  | 1.7 |
| Kitchen Group (Sink and Dishwasher) | 2.0   | 2.0  | 1.5  | 1.5 |
| Laundry Group (Sink and Clothes Washer) | 5.0   | 5.0  | 3.0  | 3.0 |

**Notes:**

1. A bathroom group, for this table, consists of one water closet, up to two lavatories, and either one bathtub or one shower.
2. A half-bath or powder room, for this table, consists of one water closet and one lavatory.
3. Multi-unit dwellings with individual water heaters use the same WSFU as for individual dwellings.
### TABLE C 303.3
**DRAINAGE FIXTURE UNIT VALUES (DFU) FOR BATHROOM GROUPS**

<table>
<thead>
<tr>
<th>Bathroom Groups having 1.6 GPF Gravity-Tank Water Closets</th>
<th>PRIVATE USE BATHROOM GROUP</th>
<th>SERVING 3 OR MORE PRIVATE USE BATHROOM GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half-Bath or Powder Room</td>
<td>3.0</td>
<td>2.0</td>
</tr>
<tr>
<td>1 Bathroom Group</td>
<td>5.0</td>
<td>3.0</td>
</tr>
<tr>
<td>1 1/2 Bathrooms</td>
<td>6.0</td>
<td>–</td>
</tr>
<tr>
<td>2 Bathrooms</td>
<td>7.0</td>
<td>–</td>
</tr>
<tr>
<td>2 1/2 Bathrooms</td>
<td>8.0</td>
<td>–</td>
</tr>
<tr>
<td>3 Bathrooms</td>
<td>9.0</td>
<td>5.5</td>
</tr>
<tr>
<td>Each Additional 1/2 Bath</td>
<td>0.5</td>
<td>–</td>
</tr>
<tr>
<td>Each Additional Bathroom Group</td>
<td>1.0</td>
<td>–</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bathroom Groups having 1.6 GPF Pressure-Tank Water Closets</th>
<th>PRIVATE USE BATHROOM GROUP</th>
<th>SERVING 3 OR MORE PRIVATE USE BATHROOM GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half-Bath or Powder Room</td>
<td>3.5</td>
<td>2.5</td>
</tr>
<tr>
<td>1 Bathroom Group</td>
<td>5.5</td>
<td>3.5</td>
</tr>
<tr>
<td>1 1/2 Bathrooms</td>
<td>6.5</td>
<td>–</td>
</tr>
<tr>
<td>2 Bathrooms</td>
<td>7.5</td>
<td>–</td>
</tr>
<tr>
<td>2 1/2 Bathrooms</td>
<td>8.5</td>
<td>–</td>
</tr>
<tr>
<td>3 Bathrooms</td>
<td>9.5</td>
<td>6.0</td>
</tr>
<tr>
<td>Each Additional 1/2 Bath</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Each Additional Bathroom Group</td>
<td>1.0</td>
<td>–</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bathroom Groups having 3.5 GPF Gravity-Tank Water Closets</th>
<th>PRIVATE USE BATHROOM GROUP</th>
<th>SERVING 3 OR MORE PRIVATE USE BATHROOM GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half-Bath or Powder Room</td>
<td>3.0</td>
<td>2.0</td>
</tr>
<tr>
<td>1 Bathroom Group</td>
<td>6.0</td>
<td>4.0</td>
</tr>
<tr>
<td>1 1/2 Bathrooms</td>
<td>8.0</td>
<td>–</td>
</tr>
<tr>
<td>2 Bathrooms</td>
<td>10.0</td>
<td>6.5</td>
</tr>
<tr>
<td>2 1/2 Bathrooms</td>
<td>11.0</td>
<td>–</td>
</tr>
<tr>
<td>3 Bathrooms</td>
<td>12.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Each Additional 1/2 Bath</td>
<td>0.5</td>
<td>–</td>
</tr>
<tr>
<td>Each Additional Bathroom</td>
<td>1.0</td>
<td>–</td>
</tr>
<tr>
<td>Bathroom Group (1.6 GPF Flushometer Valve)</td>
<td>3.0</td>
<td>–</td>
</tr>
<tr>
<td>Bathroom Group (3.5 GPF Flushometer Valve)</td>
<td>4.0</td>
<td>4.0</td>
</tr>
</tbody>
</table>

**Notes:**
1. A bathroom group, for this table, consists of not more than one water closet, up to two lavatories, and either one bathtub or one shower.
2. A half-bath or powder room, for this table, consists of one water closet and one lavatory.
SUBSTANTIATION:
Currently the UPC, Appendix C (Alternate Plumbing Systems) contains water supply fixture units (WSFU) and drainage fixture units (DFU). However, there are missing values for the “3 or more private use” categories. These categories are found in the 2021 National Standards Plumbing Code (NSPC).

The “cold” and “hot” water supply fixture units (WSFU) added Table C 303.2 were extrapolated as ¾ the value of the “cold” value found from the 2021 NSPC Table 10.14.2A. This is in accordance with the UPC Table 610.3 (Water Supply Fixture Units and Minimum Fixture Branch Pipe Sizes), footnote 3 that indicates the following: “The separate cold water and hot water fixture unit value for fixtures having both hot and cold water connections shall be permitted to be each taken as three-quarter of the listed total value of the fixture.”

Gravity tank and pressure-tank water closets will consume the “same” volume of water, therefore, is not needed to be repeated in the table. Table C 303.2 combines these two by adding “… and pressure tanks” to the first set of values and striking the repeated sections. Additionally, the last three category values remain unchanged and are to be categorized as “other groups of fixtures” which harmonized with the NSPC.

The proposed values will correlate with the 2021 NSPC for water supply fixture units (WSFU) and drainage fixture units (DFU). These current tables exist in Appendix C (Alternate Plumbing Systems) and should remain in the appendix for use and reference by the end user.

PUBLIC COMMENT 2

Code Year: 2024 UPC Section #: Table 702.1 Item #: 175


RECOMMENDATION:
Revise text

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

702.0 Fixture Unit Equivalents.
702.1 Trap Size. The unit equivalent of plumbing fixtures shown in Table 702.1 shall be based on the size of the trap required, and the unit equivalent of fixtures and devices not shown in Table 702.1 shall be based on the size of trap or trap arm.

Maximum drainage fixture units for a fixture trap and trap arm loadings for sizes up to 4 inches (100 mm) shall be in accordance with Table 702.1(1).

### TABLE 702.1
DRAINAGE FIXTURE UNIT VALUES (DFU)

<table>
<thead>
<tr>
<th>PLUMBING APPLIANCES, APPURTENANCES, OR FIXTURES</th>
<th>MINIMUM SIZE TRAP AND TRAP ARM7 (inches)</th>
<th>PRIVATE</th>
<th>PUBLIC</th>
<th>PUBLIC ASSEMBLY8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathroom Group (1.6 gpf or less water closet)</td>
<td></td>
<td>3.5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Half Group</td>
<td></td>
<td></td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>1 Bathroom Group</td>
<td></td>
<td></td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>1-1/2 Bathroom Groups</td>
<td></td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>2 Bathroom Groups</td>
<td></td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>2-1/2 Bathroom Groups</td>
<td></td>
<td></td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>3 Bathroom Groups</td>
<td></td>
<td>0.5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Each Additional Half Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each Additional Bathroom Groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom Group (Greater than 1.6 gpf water closet)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Half Group</td>
<td></td>
<td></td>
<td>3.5</td>
<td></td>
</tr>
</tbody>
</table>

702.0 Fixture Unit Equivalents.
702.1 Trap Size. The unit equivalent of plumbing fixtures shown in Table 702.1 shall be based on the size of the trap required, and the unit equivalent of fixtures and devices not shown in Table 702.1 shall be based on the size of trap or trap arm.

Maximum drainage fixture units for a fixture trap and trap arm loadings for sizes up to 4 inches (100 mm) shall be in accordance with Table 702.1(1).
### TABLE 702.1
DRAINAGE FIXTURE UNIT VALUES (DFU)

<table>
<thead>
<tr>
<th>PLUMBING APPLIANCES, APPURTEANCES, OR FIXTURES</th>
<th>MINIMUM SIZE TRAP AND TRAP ARM(^7) (inches)</th>
<th>PRIVATE</th>
<th>PUBLIC</th>
<th>ASSEMBLY(^8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinks</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Bar</td>
<td>1(^{1/2})</td>
<td>1.0</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

Notes:
1. Indirect waste receptors shall be sized based on the total drainage capacity of the fixtures that drain thereinto, in accordance with Table 702.2.
2. Provide a 2 inch (50 mm) minimum drain.
3. For refrigerators, coffee urns, water stations, and similar low demands.
4. For commercial sinks, dishwashers, and similar moderate or heavy demands.
5. Buildings having a clothes-washing area with clothes washers in a battery of three or more clothes washers shall be rated at 6 fixture units each for purposes of sizing common horizontal and vertical drainage piping.
6. Water closets shall be computed as 6 fixture units where determining septic tank sizes based on Appendix H of this code.
7. Trap sizes shall not be increased to the point where the fixture discharge is capable of being inadequate to maintain their self-scouring properties.
8. Assembly [Public Use (see Table 422.1)].
9. For a bathtub to shower retrofit, a 1\(^{1/2}\) inch (40 mm) trap and trap arm shall be permitted with a maximum shower size of 36 inches (914 mm) in width and 60 inches (1524 mm) in length. See Section 408.5 and Section 408.6.

Substantiation:
The Technical Committee did not believe a definition of half group was necessary. Therefore, a modification is proposed without the new definition.

Apparently the paper published by Tom Konen did not get distributed to the Technical Committee. The other paper on the work of Hunter was also missing. The papers have been included with this public comment. The papers do justify this modification to the table. The change should be accepted as modified.

[Supporting documentation provided in KAVI for TC review]
(portions of the table not shown remain unchanged)

For SI units: 1 inch = 25 mm

Notes:
1 Indirect waste receptors shall be sized based on the total drainage capacity of the fixtures that drain thereinto, in accordance with Table 702.2.
2 Provide a 2 inch (50 mm) minimum drain.
3 For refrigerators, coffee urns, water stations, and similar low demands.
4 For commercial sinks, dishwashers, and similar moderate or heavy demands.
5 Buildings having a clothes-washing area with clothes washers in a battery of three or more clothes washers shall be rated at 6 fixture units each for purposes of sizing common horizontal and vertical drainage piping.
6 Water closets shall be computed as 6 fixture units where determining septic tank sizes based on Appendix H of this code.
7 Trap sizes shall not be increased to the point where the fixture discharge is capable of being inadequate to maintain their self-scouring properties.
8 Assembly [Public Use (see Table 422.1)].
9 For a bathtub to shower retrofit, a 1-1/2 inch (40 mm) trap and trap arm shall be permitted with a maximum shower size of 36 inches (914 mm) in width and 60 inches (1524 mm) in length. See Section 408.5 and Section 408.6.

Substantiation:
A bathtub can be drained into an 1-1/2 stack. This allows us to vertically wet vent a tub over the vent of another fixture and use a 2” stack. A laundry tub holds less water and is not allowed to drain into a 2” wet vent because of subnote 2.

Removal of subnote 2 after(sinks)Laundry would allow a laundry sink to be wet vented like a bathtub, which holds more gray water than a laundry sink.
Proposals

Item #: 177

UPC 2024  Section: 705.6.2, Table 1701.1, Table 1701.2

SUBMITTER: Michael Cudahy
PPFA

RECOMMENDATION:
Revise text

705.0 Joints and Connections.

705.6 PVC and PVC Co-Extruded Plastic Pipe and Joining Methods.

705.6.2 Solvent Cement Joints. Solvent cement joints for PVC pipe and fittings shall be clean from dirt and moisture. Pipe shall be cut square and pipe shall be deburred. Where surfaces to be joined are cleaned and free of dirt, moisture, oil, and other foreign material, apply primer purple in color that complies with ASTM F656. Primer shall be applied to the surface of the pipe and fitting is softened. Solvent cement that comply with ASTM D2564 shall be applied to all joint surfaces. Joints shall be made while both the inside socket surface and outside surface of pipe are wet with solvent cement. Two-step joining methods shall be in accordance with ASTM D2855. Hold joint in place and undisturbed for 1 minute after assembly.

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
<th>REFERENCE STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD NUMBER</td>
<td>STANDARD TITLE</td>
</tr>
<tr>
<td>ASTM D2855-2020</td>
<td>Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: ASTM D2855 meets the requirements for a mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

<table>
<thead>
<tr>
<th>TABLE 1701.2</th>
<th>STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOCUMENT NUMBER</td>
<td>DOCUMENT TITLE</td>
</tr>
<tr>
<td>ASTM-D2855-2015</td>
<td>Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)
SUBSTANTIATION:
The standard for two step solvent cement joining is ASTM D2855, “Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.”

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as the current code language provides the needed requirements regarding joining methods of PVC pipe and joints.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 21  NEGATIVE: 4  NOT RETURNED: 1    Daniels

EXPLANATION OF NEGATIVE:

BALLANCO, GORSUCH, WHITE: The substantiation justified the acceptance of this change.

KREITENBERG: This is a fine adjustment and provides more clarity.

---

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 705.6.2, Table 1701.1, Table 1701.2

SUBMITTER: Michael Cudahy

PPFA

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
The standard explains the practice of making two-step solvent welded joints in great detail and should be included in the code.
Proposals

Item #: 178

UPC 2024  Section: 705.7 – 705.7.2, Table 1701.1

SUBMITTER: William E Chapin
Professional Code Consulting, LLC

RECOMMENDATION:
Add new text

705.0 Joints and Connections.

705.7 Polyolefin Pipe (DWV) and Joints. Joints between polyolefin plastic pipe and fittings shall be installed in accordance with the manufacturer’s installation instructions and shall comply with Section 705.7.1 or Section 705.7.2.

705.7.1 Heat-fusion Joints. Heat-fusion joints for polyolefin pipe and tubing joints shall be installed with socket-type heat-fused polyolefin fittings or electrofusion polyolefin fittings. Joint surfaces shall be clean and free from moisture. The joint shall be undisturbed until cool. Joints shall be made in accordance with ASTM F3371.

705.7.2 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint type. The push-on joint shall include an elastomeric gasket and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal. Joints shall be made in accordance with ASTM F3371.

(renumber remaining sections)

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM F3371-2019</td>
<td>Polyolefin Pipe and Fittings for Drainage, Waste, and Vent Applications</td>
<td>Piping</td>
<td>705.7.1, 705.7.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: ASTM F3371 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
ASTM F3371 was developed and published as it includes the same requirements as ASTM F1412 minus the chemical resistance testing. Also, note that other ASTM for DWV application do not include a chemical resistance test. Under the scope of ASTM F3371, two polyolefins materials are covered; polyethylene (PE) and polypropylene (PP).

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The scope of the standard is vague and does not adequately address waste system piping requirements.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Section: 705.7 – 705.7.2, Table 1701.1  Item #: 178

SUBMITTER: William Chapin  Professional Code Consulting, LLC  Comment #: 1

RECOMMENDATION:
Add new text

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

SUBSTANTIATION:
This comment request approval of the original proposal submitted.

The last part of the Committee Statement reads that the standard "does adequately address waste system requirements." The first part of the statement was that the scope was vague, which may be the reason for rejection, however the scope is identical to ASTM F1412, which is already listed in the UPC. The only difference in the two standards is the change from corrosive waste to DWV systems. Due to technical issues, we were not able to address this properly during the online versions of meetings last year despite the best efforts of staff to accommodate our issues.

PUBLIC COMMENT 2

Code Year: 2024 UPC  Section #: 212.0  Item #: 178

SUBMITTER: Phillip H Ribbs  PHR Consultants  Comment #: 2

RECOMMENDATION:
Revise text

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

212.0 – J –

Joint, Heat-Fusion Weld Joints. A joint used in some thermoplastic systems to connect the pipe to fittings or pipe lengths directly to one another (butt-fusion). This method of joining pipe to fittings includes butt-fusion, socket fusion, electro-fusion, and saddle-fusion. This method of welding involves the application of heat and pressure to the components, allowing them to fuse together forming a bond between the pipe and fitting.

SUBSTANTIATION:
This comments is addressing the term "Heat-Fusion Joint" as used in this original proposal and as used throughout the UPC. The term "weld" should not be in the definition term. The term used within the code is “heat-fusion joints” which does not contain "weld." This intends to clean up the definition by only changing the title to match what is used in the body of the code. Furthermore, the term "joint" is being moved to the front to group the definition with the other “joint” definitions.
Proposals

Item #: 180
UPC 2024  Section: 706.2

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Revise text

706.0 Changes in Direction of Drainage Flow.

706.2 Horizontal to Vertical. Horizontal drainage lines, connecting with a vertical stack, shall enter through 45 degree (0.79 rad) wye branches, 60 degree (1.05 rad) wye branches, combination wye and one-eighth bend branches, double fixture fittings, sanitary tee or sanitary tapped tee branches, or other approved fittings of equivalent sweep. No fitting having more than one inlet at the same level shall be used unless such fitting is constructed so that the discharge from one inlet cannot readily enter any other inlet. Double sanitary tees shall be permitted to be used where the barrel of the fitting is not less than two pipe sizes larger than the largest inlet, (pipe sizes recognized for this purpose are 2 inches, 2½ inches, 3 inches, 3½ inches, 4 inches, 4½ inches, 5 inches, 6 inches, etc.) (50 mm, 65 mm, 80 mm, 90 mm, 100 mm, 115 mm, 125 mm, 150 mm, etc.).

SUBSTANTIATION:
1. If a double fixture fitting can serve back to back or side by side fixture connections with no discharge from one trap arm to the other surely it is adequate to connect horizontal drain lines to a stack.
2. Double fixture fittings are a wye type fitting. Depending upon the material and manufacture the angle may be 45 to 60 degrees, complying with the requirements but not listed as an acceptable fitting
3. From UPC A & A Committee UPC 16-163:
Yes, a figure 5 fitting meets the requirements found in Section 706.2 for horizontal to vertical change in direction.
4. From UPC A&A Committee UPC 20-93:
Yes. Section 706.2 of the 2018 Uniform Plumbing Code (UPC), states “…No fitting having more than one inlet at the same level shall be used unless such fitting is constructed so that the discharge from one inlet cannot readily enter any other inlet.” A figure five cast iron fitting, though designed for back-to-back fixture connections, is configured to prevent the discharge from one inlet from entering the adjacent inlet.
COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed double fixture fitting does not have the necessary continuous radial sweep.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 706.2 Item #: 180

SUBMITTER: Douglas Kirk Self

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
The reason for rejection was, "The proposed double fixture fitting does not have the necessary continuous radial sweep."

All you have to do is look at the images of the fitting (in the original UPC proposal Item #180) to know the stated reason is not supported by the facts.

The reasons previously submitted continue to be valid:
1. If a double fixture fitting can serve back to back or side by side fixture connections with no discharge from one trap arm to the other, it follows that it is adequate to connect horizontal drain lines to a stack.
2. Double fixture fittings are a wye type fitting. Depending upon the material and manufacture the angle may be 45 to 60 degrees, complying with the requirements of the section.

3. In at least 2 instances the UPC Answers & Analysis Committee has clearly stated that a double fixture fitting (AKA Figure 5) meets the requirements of 706.2.
   a. UPC 16-163: Yes, a figure 5 fitting meets the requirements found in Section 706.2 for horizontal to vertical change in direction.
   b. UPC 20-93: Yes. Section 706.2 of the 2018 Uniform Plumbing Code (UPC), states “…No fitting having more than one inlet at the same level shall be used unless such fitting is constructed so that the discharge from one inlet cannot readily enter any other inlet.” A figure five cast iron fitting, though designed for back-to-back fixture connections, is configured to prevent the discharge from one inlet from entering the adjacent inlet.
Proposals

Item #: 181
UPC 2024  Section: 707.4

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Revise text

707.0 Cleanouts.

707.4 Location. Each horizontal drainage pipe shall be provided with a cleanout at its upper terminal, and each run of piping, that is more than 100 feet (30 480 mm) in total developed length, shall be provided with a cleanout for each 100 feet (30 480 mm), or fraction thereof, in length of such piping. An additional cleanout shall be provided in a drainage line for each aggregate horizontal change in direction exceeding 135 degrees (2.36 rad). A cleanout shall be installed above the fixture connection fitting, serving each urinal, regardless of the location of the urinal in the building.

Exceptions:
(1) Cleanouts shall be permitted to be omitted on a horizontal drain line less than 5 feet (1524 mm) in length unless such line is serving sinks or urinals.
(2) Cleanouts shall be permitted to be omitted on a horizontal drainage pipe installed on a slope of 72 degrees (1.26 rad) or less from the vertical angle (one-fifth bend).
(3) Excepting the building drain, its horizontal branches, kitchen sinks, and urinals, a cleanout shall not be required on a pipe or piping that is above the floor level of the lowest floor of the building.
(4) An approved type of two-way cleanout fitting or field made double wye (wye and 1/8 bend fitting) in a back to back configuration, installed inside the building wall near the connection between the building drain and the building sewer or installed outside of a building at the lower end of a building drain and extended to grade, shall be permitted to be substituted for an upper terminal cleanout.

SUBSTANTIATION:
While many of us may not be fans of two cleanouts, they are permitted.
The question is which design offers the best experience for a snaking a drain?
The ‘approved type of two-way cleanout(1)’ has one opening and the deeper in the ground it is located the less control you have on which way the cable it is going to travel in the building sewer. In this pattern there is also a ‘dead’ spot(2) the snake is unable to clean.

The field made two-way cleanout has two openings and the direction of travel is assured. Most users (drain cleaners) believe the field made two-way cleanout is a superior design.
Many times the inspector will reject the installation of the field made two-way cleanout, (commenting it’s design allows better access) because it is not included in 707.4.

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**
A field installed combination fitting would be installed in reverse when the fitting is required to be installed in the direction of flow.

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 24  NEGATIVE: 1  NOT RETURNED: 1  Daniels

**EXPLANATION OF NEGATIVE:**

**NIELSEN:** I think this is a good idea and should be allowed.

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**Appended Comments**

**PUBLIC COMMENT 1**

**Code Year:** 2024 UPC  **Section #:** 707.4(4)  **Item #:** 181

**SUBMITTER:** Douglas Kirk  **Self**  **Comment #:** 1

**RECOMMENDATION:**
Revise text

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

**SUBSTANTIATION:**
The Technical Committee rejected the proposal for the following reason: A field installed combination fitting would be installed in reverse when the fitting is required to be installed in the direction of flow.

I submit the same is true of the APPROVED 2-way Cleanout fitting.

My supporting substantiation is as follows:
While many of us may not be fans of two cleanouts, they are permitted. The question is which design offers the best results for snaking a drain?

The ‘approved type of two-way cleanout(1)’ has one opening and the deeper in the ground it is located the less control you have on which way the cable it is going to travel in the building sewer. In this pattern there is also a ‘dead’ spot(2) the snake is unable to clean.
The field made two-way cleanout has two openings and the direction of travel is assured. Most users (drain cleaners) believe the field made two-way cleanout is a superior design.

Many times the inspector will reject the installation of the field made two-way cleanout, (commenting it’s design allows better access) because it is not included in 707.4 (Location).
Proposals

Item #: 184

UPC 2024  Section: 708.1

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION: Revise text

708.0 Grade of Horizontal Drainage Piping.

708.1 General. Horizontal drainage piping shall be run in practical alignment and a uniform slope of not less than ¼ inch per foot (20.8 mm/m) or 2 percent toward the point of disposal, provided that where Exception: Where it is impractical due to the depth of the street sewer, to the structural features, or to the arrangement of a building or structure to obtain a slope of ¼ inch per foot (20.8 mm/m) or 2 percent, such pipe or building drain piping 4 inches (100 mm) or larger in diameter shall be permitted to have a slope of not less than 1/8 inch per foot (10.4 mm/m) or 1 percent, where first approved by the Authority Having Jurisdiction.

SUBSTANTIATION: Because building drain and building sewer requirements are both in the same chapter, identifying what is being referenced and spoken about will be helpful for the end user. Furthermore, the addition of a exception for the language stated in Section 708.1 is being added to separate the language where a 1/4 inch is not practical.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT: As proposed, this will only apply to building drains. The section needs to apply to all horizontal piping.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 708.1  Item #: 184

SUBMITTER: Douglas Kirk
Self

RECOMMENDATION: Revise text

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

708.0 Grade of Horizontal Drainage Piping.

708.1 General. Building drain and other horizontal drainage piping shall be run in practical alignment and a uniform slope of not less than ¼ inch per foot (20.8 mm/m) or 2 percent toward the point of disposal, provided that, where Exception: Where it is impractical due to the depth of the street sewer, to the structural features, or to the arrangement of a building or structure to obtain a slope of ¼ inch per foot (20.8 mm/m) or 2 percent, such pipe or building drain piping...
4 inches (100 mm) or larger in diameter shall be permitted to have a slope of not less than 1/8 inch per foot (10.4 mm/m) or 1 percent, when first approved by the Authority Having Jurisdiction. (below shown for reference only)

718.0 Grade, Support, and Protection of Building Sewers.

718.1 Slope. Building sewers shall be run in practical alignment and at a uniform slope of not less than 1/4 inch per foot (20.8 mm/m) toward the point of disposal. Exception: Where approved by the Authority Having Jurisdiction and where it is impractical, due to the depth of the street sewer, or to the structural features or the arrangement of a building or structure, to obtain a slope of 1/4 inch per foot (20.8 mm/m), such pipe or piping 4 inches (100 mm) through 6 inches (150 mm) shall be permitted to have a slope of not less than 1/8 inch per foot (10.4 mm/m) and such piping 8 inches (200 mm) and larger shall be permitted to have a slope of not less than 1/16 inch per foot (5.2 mm/m). The maximum and minimum fixture unit loading shall be in accordance with Table 717.1.

SUBSTANTIATION:
The Technical Committee rejected the original proposal for the following reason: "This will only apply to building drains. The section needs to apply to all horizontal piping."

Horizontal piping has been added back into the section 718.1 (Grade, Support, and Protection of Building Sewers). The required grade of building sewer is covered in 718.1 is shown above for information.

The Exception is added to separate what is allowed when 1/4"/ft is not practical.
Proposals

Item #: 187
UPC 2024  Section: 710.4

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

710.0 Drainage of Fixtures Located Below the Next Upstream Manhole or Below the Main Sewer Level.

710.4 Discharge Line. The discharge line from such ejector, pump, or another mechanical device shall be made of approved pressure rated materials listed in Table 701.2 and be provided with an accessible backwater or swing check valve and gate or ball valve. Where the gravity drainage line to which such discharge line connects is horizontal, the method of connection shall be from the top through a wye branch fitting. The gate or ball valve shall be located on the discharge side of the backwater or check valve.

Gate or ball valves, where installed in drainage piping, shall be fullway type with working parts of corrosion-resistant metal. Sizes 4 inches (100 mm) or more in diameter shall have cast-iron bodies and sizes less than 4 inches (100 mm), cast-iron or copper alloy bodies.

SUBSTANTIATION:
The phrase "approved pressure rated" does not provide the installer or AHJ with the pressure rating required or type of material that may be used for the installation. Due to the confusion, many jurisdictions are now requiring pressure rated potable water piping for ejector discharge lines. By doing this, pressure fittings are being used instead of DWV fittings as required in Section 706.0. The Code has allowed DWV piping to be used for ejector discharge lines since 1946. If failures had been reported, the Code would have been changed prior to 2015.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
Not all pipe material in Section 701.2 is pressure rated.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024 UPC  Section #: 710.4  Item #: 187
SUBMITTER: Douglas Kirk
Self

RECOMMENDATION:
Revise text

Request to replace the code change proposal by this public comment.
710.0 Drainage of Fixtures Located Below the Next Upstream Manhole or Below the Main Sewer Level.

710.4 Discharge Line. The discharge line from such ejector, pump, or another mechanical device shall be of approved materials whose tested pressure rating is equal to or greater than the "total dynamic head" produced by the pump pressure rated material and be provided with an accessible backwater or swing check valve and gate or ball valve. Where the gravity drainage line to which such discharge line connects is horizontal, the method of connection shall be from the top through a wye branch fitting. The gate or ball valve shall be located on the discharge side of the backwater or check valve.

Gate or ball valves, where installed in drainage piping, shall be fullway type with working parts of corrosion resistant metal. Sizes 4 inches (100 mm) or more in diameter shall have cast-iron bodies and sizes less than 4 inches (100 mm), cast-iron or copper alloy bodies.

SUBSTANTIATION:
The original substantiation for adding the language requiring, "pressure rated material," stated "the section was silent on the type of material that is approved for discharge lines and should be addresses for ease of enforcement and application."

My observation is that it has not made either enforcement or application easier.

The 'tested pressure rating' is available from various sources: https://www.engineeringtoolbox.com/pipes-pressure-rating-t_40.html

See included documentation, from the A & A database, that the revised language is consistent with their answers.

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

Item #: 190

UPC 2024  Section: 712.4 – 712.4.2

SUBMITTER: Riley Dvorak
Forterra

RECOMMENDATION:
Add new text

712.0 Testing.

712.4 Deflection Testing. All plastic storm and sanitary drainage piping greater than or equal to 8 inches (200 mm) in diameter shall be deflection tested. Deflection test shall be conducted no sooner than 30 days after completion of final backfill and compaction testing. The maximum allowable deflection shall be 5 percent unless stated otherwise in the project specifications. All lines shall be cleaned or flushed prior to testing. The deflection test shall be performed on entire length of installed flexible pipeline upon completion of work adjacent to and over the pipeline, including backfilling, placement of fill, grading, paving, placement of concrete, and any other superimposed loads. Deflection of pipe in the installed pipeline under external loads shall not exceed limits as percent of the average inside diameter of pipe. Use a laser profiler or mandrel to determine if allowable deflection has been exceeded.

712.4.1 Laser Profiler. The pipe interior shall be inspected with laser profiling equipment accompanied with video surveillance. Low barrel distortion video equipment shall be utilized for pipe sizes 48 inches (1219 mm) or less. A camera with suitable lighting shall be used to allow a clear picture of the entire periphery of the pipe interior. The camera shall be centered in the pipe both vertically and horizontally. The camera shall be able to pan and tilt to a 90 degree (1.57 rad) angle with the axis of the pipe rotating 360 degrees (6.28 rad). Use equipment to move the camera through the pipe that will not obstruct the camera's view or interfere with proper documentation of the pipe's condition. The video image shall be clear, focused, and relatively free from roll static or other image distortion qualities that would prevent the reviewer from evaluating the condition of the pipe. For initial post installation inspections for pipe sizes larger than 48 inches (1219 mm), a visual inspection shall be completed of the pipe interior.

712.4.2 Mandrel. The mandrel shall be passed through each run of pipe by pulling it by hand. If deflection readings in excess of the allowable deflection of average inside diameter of pipe are obtained, stop and begin test from the opposite direction. The mandrel shall meet the pipe manufacture's recommendations and the following requirements. The mandrel shall be rigid, nonadjustable, have a minimum of 9 fins, pulling rings at each end, and is engraved with the nominal pipe size and mandrel outside diameter. The mandrel shall be 5 percent less than the certified-actual pipe diameter. The Authority Having Jurisdiction shall verify the outside diameter (OD) of the contractor provided mandrel through the use of Contractor provided proving rings.

SUBSTANTIATION:
Currently there are no limiting criteria for deflection of flexible storm and sanitary sewer pipes within the UPC. Deflection testing of flexible products serves to ensure owners and designers that compaction around the pipe has been completed to a satisfactory level and that no construction activities have damaged the pipe. Over-deflection is an indication that the pipe was not installed to the expected level of quality and subsequently may not last its intended service life.

Deflection testing is a very common practice for storm and sanitary sewers in countless local standards and almost every national specification for these types of products. It should be an especially important consideration for pipes within the jurisdiction of the UPC. Deflection testing is ultimately a relatively inexpensive quality assurance test that provides value-added to owners ensuring them that the pipes installed properly.
The verbiage proposed is from the United Facilities Guide Specifications 33 40 00 Section 3.9.1.4 modified slightly to fit this Plumbing Code section and format.

Supporting document(s) has been provided to the Technical Committee for review.

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**
The proposal is being rejected as it is targeted to specific materials where other materials can have deflection issues. Furthermore, the language is overly restrictive as it would create an undue burden.

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

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**PUBLIC COMMENT 1**

Code Year: 2024 UPC  Section #: 723.2 - 723.2.2  
SUBMITTER: Riley Dvorak Forterra  

**RECOMMENDATION:**
Add new text

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

723.0 Building Sewer Test.

**723.2 Deflection Testing.** All flexible storm and sanitary drainage piping greater than or equal to 8 inches (200 mm) in diameter shall be deflection tested. Deflection test shall be conducted no sooner than 30 days after completion of final backfill and compaction testing unless approved by the Authority Having Jurisdiction. The maximum allowable deflection shall be 5 percent unless stated otherwise in the project specifications. All lines shall be cleaned or flushed prior to testing. The deflection test shall be performed on entire length of installed flexible pipeline upon completion of work adjacent to and over the pipeline, including backfilling, placement of fill, grading, paving, placement of concrete, and any other superimposed loads. Deflection of pipe in the installed pipeline under external loads shall not exceed limits as percent of the average inside diameter of pipe. Use a laser profiler or mandrel to determine if allowable deflection has been exceeded. Installed pipe sections exceeding the deflection limit shall be removed and replaced unless the Authority Having Jurisdiction approves an alternative method of remediation.

**723.2.1 Laser Profiler.** The pipe interior shall be inspected with laser profiling equipment accompanied with video surveillance. Low barrel distortion video equipment shall be utilized for pipe sizes 48 inches (1219 mm) or less. A camera with suitable lighting shall be used to allow a clear picture of the entire periphery of the pipe interior. The camera shall be centered in the pipe both vertically and horizontally. The camera shall be able to pan and tilt to a 90 degree (1.57 rad) angle with the axis of the pipe rotating 360 degrees (6.28 rad). Use equipment to move the camera through the pipe that will not obstruct the camera's view or interfere with proper documentation of the pipe's condition. The video image shall be clear, focused, and relatively free from roll static or other image distortion qualities that would prevent the reviewer from evaluating the condition of the pipe. For initial post installation inspections for pipe sizes larger than 48 inches (1219 mm), a visual inspection shall be completed of the pipe interior.

**723.2.2 Mandrel.** The mandrel shall be passed through each run of pipe by pulling it by hand. If deflection readings in excess of the allowable deflection of average inside diameter of pipe are obtained, stop and begin test from the opposite direction. The mandrel shall meet the pipe manufacturer's recommendations and the following requirements. The mandrel shall be rigid, nonadjustable, have a minimum of 9 fins, pulling rings at each end, and is engraved with the nominal pipe size and mandrel outside diameter. The mandrel shall be 5 percent less than the certified-actual pipe diameter. The Authority Having Jurisdiction shall verify the outside diameter (OD) of the contractor provided mandrel through the use of Contractor provided proving rings.
SUBSTANTIATION:
There were 2 noted issues with the original proposal #190.

The first issue was that the proposed testing seemed targeted to only apply to plastic materials. To address this, the proposal has been revised by replacing the word “plastic” with “flexible.” This new term, by definition, now includes all pipe materials where monitoring deflection is applicable.

The second stated issue with this proposal was that the testing is overly restrictive and creates an undue burden. It is well understood that this testing is very common in the industry and has a perceived value for many agencies. The entire purpose of deflection testing is to prevent severe long-term issues from occurring by addressing those issues early-on. Understandably the 30-day wait period for deflection testing means that replacing an over-deflected pipeline may be a significant undertaking; however, this undertaking is much less significant than if the line were to fail and need replacement after a few years of use. To address the concerns brought forth by the committee, verbiage has been added that will allow the Authority Having Jurisdiction to approve deflection testing sooner than 30 days on an as-needed basis. Additionally, AHJ’s, can approve alternative remediation solutions when replacement of over-deflected pipe may be impossible or highly inconvenient.
Proposals

Item #: 196

UPC 2024  Section: 715.3, Table 1701.1, Table 1701.2

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Revise text

715.0 Building Sewer Materials.

715.3 Existing Sewers. Where permitted by the Authority Having Jurisdiction, in accordance with Section 301.3, trenchless methods of rehabilitation Replacement of existing building sewer and building storm sewers using trenchless methodology and materials shall be installed in accordance with the standards listed in Chapter 17, ASTM F1216, ASTM F2561, ASTM F2599, or ASTM F3240.

<table>
<thead>
<tr>
<th>TABLE 1701.1  REFERENCED STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD NUMBER</td>
</tr>
<tr>
<td>ASTM F1216-2016</td>
</tr>
<tr>
<td>ASTM F2561-2017</td>
</tr>
<tr>
<td>ASTM F2599-2016</td>
</tr>
<tr>
<td>ASTM F3240-2017</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

<table>
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<tr>
<th>TABLE 1701.2  STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES</th>
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<tr>
<td>ASTM F2599-2020</td>
</tr>
<tr>
<td>ASTM F3240-2019</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)
SUBSTANTIATION:
There is nothing in the current language of this section that requires a permit. Language is being added to require permits and inspections by the AHJ. These standards contain a section on “significance in use” which does not address installers. These standards are installation standards, and in order to properly enforce, the AHJ would have to be present during the entire installation. For example, it is required that the cleaning of the line prior to the installation would require inspection; there are provision in the standards which need to be addressed by the AHJ.

ASTM F1216 is not written in mandatory language. All the other standards reference ASTM F1216 which is not enforceable, therefore should all be moved to Table 1701.2.

The standards ASTM F2599, ASTM F3240, and ASTM F2561 places undue responsibility and liability on the AHJ. These standards all contain a Section 1.4 which indicates the following: "1.4 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use."

COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC

Amend proposal as follows:

715.3 Existing Sewers. Where permitted by the Authority Having Jurisdiction, in accordance with Section 301.3, trenchless methods of rehabilitation of existing building sewer and building storm sewers shall be installed in accordance with the standards listed in Chapter 17.

715.3.1 Sewer Pipe Lining. For trenchless installation of resin-impregnated flexible tubing to line existing building sewers and building storm sewers see the applicable standards listed in Table 1701.2.

715.3.2 Sewer Pipe Replacement. For trenchless installation of polyethylene (PE) pipe using the pipe bursting method to replace existing building sewers and building storm sewers see the applicable standards listed in Table 1701.2.

TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

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<tbody>
<tr>
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</tr>
<tr>
<td>ASTM F2561-2020</td>
<td>Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One Piece Main and Lateral Cured-in-Place Liner</td>
<td>Piping</td>
</tr>
<tr>
<td>ASTM F2599-2020</td>
<td>The Sectional Repair of Damaged Pipe by Means of an Inverted Cured-In-Place Liner</td>
<td>Piping</td>
</tr>
<tr>
<td>ASTM F3240-2019</td>
<td>Installation of Seamless Molded Hydrophilic Gaskets (SMHG) for Long-Term Watertightness of Cured-in-Place Rehabilitation of Main and Lateral Pipelines</td>
<td>Piping</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

COMMITTEE STATEMENT:
The modification is adding provisions to ensure that such rehabilitation methods are approved by the AHJ prior to installation. Additionally, the standards referenced in the existing Section 715.3 are considered a list of additional approved standards, publications, practices, and guides that are being relocated to Table 1701.2. Currently standards are written in non-mandatory language as exemplified by ASTM F1216 which has 16 "may," 15 "shall," and 102 "should."

Furthermore, as indicated in the proponent's substantiation: ASTM F1216 is not written in mandatory language. All the other standards reference ASTM F1216 which is not enforceable, therefore should all be moved to Table 1701.2.

The ASTM F2599, ASTM F3240, and ASTM F2561 standards place undue responsibility and liability on the AHJ. These standards all contain a Section 1.4 which indicates the following: "1.4 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use."

206
TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 22 NEGATIVE: 3 NOT RETURNED: 1 Daniels

EXPLANATION OF NEGATIVE:

BALLANCO: This change is inconsistent with procedures for referencing standards. The code should never be referencing random standards in Table 1701.2. When the standards are appropriate to reference, they are included in Table 1701.1. The proposal should have been rejected since the proper approach to referencing the standards is correct as currently shown in the UPC.

GORSUCH, WHITE: I agree with Julius Ballanco.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 715.3, Table 1701.1, Table 1701.2 Item #: 196

SUBMITTER: Julius Ballanco, P.E. JB Engineering and Code Consulting, P.C. Rep. Self Comment #: 1

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
Having previously chaired the Standards Working Group, I believe it is imperative that this item be rejected. The major premise of the Standards Working Group was the development of two tables. If a standard is referenced in the code, the standard belongs in the Table 1701.1. If a standard is not appropriate to list in the code, it can be listed in Table 1701.2. However, when listed in Table 1701.2 there is NO reference to the standard in the code. Furthermore, there is no direction to be given in the code to Table 1701.2 other than a general reference in Chapter 3.

This change proposes to go back to the old confusing way of referencing a table without identifying a standard. This is completely inappropriate. Either the standard is listed in the code and Table 1701.1 or it is not listed in the code.

The proponent provides no justification for removing the reference to the standards. Additionally, the text "Where permitted by the authority having jurisdiction" is language that was also removed from the code. Without guidelines provided to the authority having jurisdiction, this is a meaningless statement.
PUBLIC COMMENT 2

Item #: 196

Comment #: 2

SUBMITTER: Sidney L Cavanaugh
Cavanaugh Consulting

RECOMMENDATION:
Revise text

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

715.0 Building Sewer Materials.

715.3 Existing Sewers. Where permitted by the Authority Having Jurisdiction, trenchless methods of Rehabilitation of existing building sewer and building storm sewers using CIPP (Cured-in-Place-Pipe) shall be installed in accordance with the following: ASTM F1216, ASTM F2561, ASTM F2599, and ASTM F3240.

715.3.1 Sewer Pipe Lining. For trenchless installation of resin impregnated flexible tubing to line existing building sewers and building storm sewers see the applicable standards listed in Table 1701.2.

715.3.2 Sewer Pipe Replacement. For trenchless installation of polyethylene (PE) pipe using the pipe bursting method to replace existing building sewers and building storm sewers see the applicable standards listed in Table 1701.2.

715.4 Post-Installation Inspection. The rehabilitated pipe shall be inspected internally by a recorded video camera survey. The video survey shall be submitted to the Authority Having jurisdiction prior to acceptance of the work. Any defects identified shall be repaired or replaced as approved by the Authority Having Jurisdiction in accordance with applicable standards in Section 715.3.

205.0 -C-

CIPP (Cured-in-Place-Pipe). A thermoset resin saturated into an absorbent textile tube pressed against an inner pipe wall and cured to form a new pipe within a pipe.

TABLE 1701.1
REFERRED STANDARDS

<table>
<thead>
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<td>Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One Piece Main and Lateral Cured-in-Place Liner</td>
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</table>

(portions of table not shown remain unchanged)

Note: ASTM F2561, ASTM F2599, and ASTM F3240 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

Note: ASTM F1216 does not meet the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

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</tbody>
</table>
SUBSTANTIATION:
The current wording in the code is incorrect and creates confusion. We are not replacing the pipe in Section 715.3 but rehabilitating the existing piping using CIPP. All the standards currently referenced in the code are only about rehabilitation using CIPP technology. Secondly, post inspection is important for this process and should be required by this code. Other codes have recognized this and have much more extensive requirements regarding inspection. Finally, a proper definition of CIPP should be in the code which mirrors that which is in the referenced standards.

PUBLIC COMMENT 3

Code Year: 2024 UPC Section #: 715.3 - 715.3.2, Table 1701.1, Table 1701.2 Item #: 196

SUBMITTER: Sidney L Cavanaugh Cavanaugh Consulting Comment #: 3

RECOMMENDATION:
Revise text

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

715.0 Building Sewer Materials.

715.3 Existing Sewers. Where permitted by the Authority Having Jurisdiction, trenchless methods of rehabilitation of existing building sewers and building storm sewers shall be installed in accordance with this section. The following—

- Sectional cure-in-place (CIPP) rehabilitation of building sewer piping and sewer service lateral piping shall be in accordance with ASTM F2599. Main and lateral cure-in-place (CIPP) rehabilitation of building sewers and sewer service lateral pipe and their connection to the main sewer pipe shall be in accordance with ASTM F2561. Hydrophilic rings or gaskets in cured-in-place (CIPP) rehabilitation of building sewer pipe and sewer pipe laterals shall be in accordance with ASTM F3240 to ensure water tightness and elimination of ground water penetration.

715.3.1 Sewer Pipe Lining. For trenchless installation of resin-impregnated flexible tubing to line existing building sewers and building storm sewers see the applicable standards listed in Table 1701.2.

715.3.2 Sewer Pipe Replacement. For trenchless installation of polyethylene (PE) pipe using the pipe bursting method to replace existing building sewers and building storm sewers see the applicable standards listed in Table 1701.2.

TABLE 1701.1
REFERRED TO STANDARDS

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</table>

Note: ASTM F2561, ASTM F2599, and ASTM F3240 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.
### TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

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<tbody>
<tr>
<td>ASTM F2661-2020</td>
<td>Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One Piece Main and Lateral Cured-in-Place Liner</td>
<td>Piping</td>
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<tr>
<td>ASTM F2599-2020</td>
<td>The Sectional Repair of Damaged Pipe by Means of an Inverted Cured-In-Place Liner</td>
<td>Piping</td>
</tr>
<tr>
<td>ASTM F3240-2019</td>
<td>Installation of Seamless Molded Hydrophilic Gaskets (SMHG) for Long-Term Watertightness of Cured in Place Rehabilitation of Main and Lateral Pipelines</td>
<td>Piping</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The rational used by the Committee to make the proposed revision of Section 715.3 is wrong on many fronts. One is the fact that any rehabilitation of building sewers or storm sewers would require a permit which would be treated as any other permit issued by the AHJ and not prior approval as the proposed wording implies. Secondly, the moving of currently referenced standards (2021 edition) from Table 1701.1 to Table 1701.2 is technically incorrect. The current referenced standards (ASTM F2561, ASTM F2599 and ASTM F3240) met all IAPMO criteria for inclusion in Table 1701.1. The fact they have a standard non-liability statement like all other standards referenced in the code does not change that. This proposed wording change in the public comment strengthens the code in defining the proper use for each standard referenced. Finally, there is no standard for pipe bursting currently in the code. Section 715.3.1 and the terminology in Section 715.3.2 are not correct. Therefore, both Section 715.3.1 and Section 715.3.2 should be deleted.
Proposals

Item #: 212
UPC 2024  Section: 814.5

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Revise text

814.0 Condensate Waste and Control.

814.5 Point of Discharge. Air-conditioning condensate waste pipes shall connect indirectly, except where permitted in Section 814.6, to the drainage system through an air gap or air break to trapped and vented receptors, dry wells, or leach pits, or the tailpiece of plumbing fixtures. A condensate drain shall be trapped in accordance with the appliance manufacturer’s instructions or as approved. Exception: Direct connections as permitted in Section 814.6.

(814.6 is shown for information only)

814.6 Condensate Waste from Air-Conditioning Coils. Where the condensate waste from air-conditioning coils discharges by direct connection to a lavatory tailpiece or to an approved accessible inlet on a bathtub overflow, the connection shall be located in the area controlled by the same person controlling the air-conditioned space.

SUBSTANTIATION:
The first sentence of Section 814.5 starts with indirect connection and then gives the exception. The change relocates language in Section 814.5 to an exception for clarity and to ensure it is not overlooked. Such "direct" connection to the tailpiece is covered in Section 814.6. Additionally, the term “tailpiece of plumbing fixtures” is grouped with the list of locations allowed for “air gap” or “air breaks.” A connection to a tailpiece of a plumbing fixture is neither through an air break or air gap.

COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC

Amend proposal as follows:

814.0 Condensate Waste and Control.

814.5 Point of Discharge. Air-conditioning condensate waste pipes shall connect indirectly to the drainage system through an air gap or air break to trapped and vented receptors, dry wells, mop sinks, or leach pits. A condensate drain shall be trapped in accordance with the appliance manufacturer’s instructions or as approved. Exception: Direct connections as permitted in Section 814.6.

COMMITTEE STATEMENT:
The modification includes "mop sinks" which was accepted in Item # 211. The modification clarifies that mop sinks are an option for indirect connections for condensate waste pipes. Condensate drainage through mop sinks is common and will assist the end user in installing indirect waste piping.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS:  AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

The TCC has the responsibility to resolve conflicts and achieve correlation among the recommendations of the Technical Committee. The TCC has the authority to choose between alternative text recommended by the Technical Committee, but only as necessary for correlation, consistency, and the correction of errors and omissions in accordance with Section 3-4 of the Regulations Governing Committee Projects.
Actions taken on UPC Item # 212, Section 814.5 (Point of Discharge) and UMC Item # 074, Section 310.5 (Point of Discharge) resulted in conflicting language between the codes. In order to correlate the language, the Technical Correlating Committee proposed the following modifications to the UPC:

814.0 Condensate Waste and Control.

814.5 Point of Discharge. Air-conditioning condensate waste pipes shall connect indirectly to the drainage system through an air gap or air break to trapped and vented receptors, dry wells, mop sinks, or leach pits. A condensate drain shall be trapped in accordance with the appliance manufacturer’s instructions or as approved.

Exception: Direct connections as permitted in accordance with Section 814.6.

TCC ACTION: ACCEPT AS SUBMITTED

TCC STATEMENT: The language in UPC Item # 212, Section 814.5 (Point of Discharge) is being revised to correlate with the action taken by the UMC TC for Item # 074, Section 310.5 (Point of Discharge) to change the phrase “as permitted in” to “in accordance with” for consistency throughout the code.

The action moves forward as approved by the TCC and supersedes the recommendation from the UPC TC for actions taken for Section 814.5 regarding changing the phrase from “as permitted in” to “in accordance with.”
Note: ASME A112.18.8 and IAPMO IGC 196 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

**SUBSTANTIATION:**

The primary concern with the connection to indirect waste pipe from multiple condensate drains is the free passage of air between spaces. Without a means of preventing the movement of air in the indirect waste pipe, biohazardous airborne materials can easily migrate between building spaces. This can result in a medical emergency from exposure to viruses, germs, or chemicals emanating into a space.

Since the connection of the condensate is indirect, there are no hard piping connections that closes off the piping between different building spaces. There needs to be a means or mechanism that isolates the open piping while still allowing the pipe to serve as an indirect waste pipe. This mechanism would prevent the movement of contaminated air between different spaces in a building. Two currently available devices that would provide the isolation of air movement through an indirect waste pipe are sanitary waste valves and condensate traps. These devices are regulated by ASME A112.18.8 and IAPMO IGC 196 respectively. Both devices will isolate the air movement and are proven by testing and listing to the referenced standards.

To a lesser degree, a water seal trap could provide isolation of air movement. The problem with a trap is that if the trap loses the water seal, the trap provides no protection against air movement. Condensate drains may not operate for months, thus leaving the trap with no source of water for refilling due to evaporation. For that reason, the only possible means of accepting a water seal trap as an alternative to the two devices is to mandate a trap seal primer valve. While the alternative of a trap with trap seal primer is included in the acceptable means of protection from air movement, it is the poorest of the three methods identified.

This public comment is a life safety issue in protecting the public from transmission of airborne contaminants between building spaces. This concern has become more apparent with the current pandemic facing the world. It is imperative that the Plumbing Code and Mechanical Code address the issue with means of preventing a hazardous situation.

The UMC/UPC Condensate Task Group was appointed by the Chairs of the Plumbing Technical Committee and Mechanical Technical Committee. The Task Group met numerous times to develop this public comment.

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**PUBLIC COMMENT 2**

**Code Year:** 2024 UPC  **Section #:** 814.5  **Item #:** 212  
**SUBMITTER:** Douglas Kirk  
**Self**  
**Comment #:** 2  

**RECOMMENDATION:**  
Revise text  
Request to accept the code change proposal as modified by this public comment.

814.0 Condensate Waste and Control.

814.5 Point of Discharge. Air-conditioning condensate waste pipes shall connect indirectly to the drainage system through an air gap or air break to trapped and vented receptors, dry wells, mop sinks, leach pits, or the tailpiece of plumbing fixtures. A condensate drain shall be trapped in accordance with the appliance manufacturer’s instructions or as approved.  
**Exception:** Direct connections as permitted in Section 814.6.

(above shown for reference only)

814.6 Condensate Waste from Air-Conditioning Coils. Where the condensate waste from air-conditioning coils discharges by direct connection to a lavatory tailpiece or to an approved accessible inlet on a bathtub overflow, the connection shall be located in the area controlled by the same person controlling the air-conditioned space.
SUBSTANTIATION:
I believe Section 814.6 was only written to protect condensate discharge connected to lavatories or bathtub overflows, from overflowing with condensate, by requiring the thermostat to be located in the same space. Period.

The connection to the tailpiece of any fixture, whether it is called direct or indirect, is the done under the same conditions with the same potential results.

Referencing the Answers & Analysis database — "The connection of a condensate drain to the tailpiece of a lavatory described in Section 814.6 of the UPC is considered an airbreak. The lavatory is acting as an indirect waste receptor for the condensate waste line. (see definition of air break*)".

If we can agree with the second paragraph, that a connection to any tailpiece is the same as any other tailpiece (all tailpieces are created equal) and the 3rd paragraph, a consensus answer from an IAPMO Committee that a connection to a tailpiece is considered an "air break" with the fixture serving as a indirect waste receptor......then any tailpiece (with a couple of exceptions centering around PH) can serve as a connection for condensate waste.

[Supporting documentation is provided in KAVI for TC review]

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PUBLIC COMMENT 3

Code Year: 2024 UPC Section #: 814.5 Item #: 212

SUBMITTER: Douglas Kirk Self

Comment #: 3

RECOMMENDATION:
Revise text

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

814.0 Condensate Waste and Control.

814.5 Point of Discharge. Air-conditioning condensate waste pipes shall connect indirectly to the drainage system through an air gap or air break to trapped and vented receptors, dry wells, mop sinks, leach pits, or the accessible tailpiece of kitchen, bar or laundry sinks. A condensate drain shall be trapped in accordance with the appliance manufacturer’s instructions or as approved.

Exception: Direct connections as permitted in Section 814.6.

(below shown for reference only)

814.6 Condensate Waste from Air-Conditioning Coils. Where the condensate waste from air-conditioning coils discharges by direct connection to a lavatory tailpiece or to an approved accessible inlet on a bathtub overflow, the connection shall be located in the area controlled by the same person controlling the air-conditioned space.

SUBSTANTIATION:
I believe section 814.6 was only included to protect condensate discharge connected to lavatories or bathtub overflows, from overflowing with condensate, by requiring the thermostat be located in the same space. Period. The connection to the tailpiece of any fixture, whether it is called direct or indirect, is the done under the same conditions with the same potential results.

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[Supporting documentation provided in KAVI for TC review]
Proposals

Item #: 216

UPC 2024  Section: 908.2.1

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Revise text

908.0 Wet Venting.

908.2 Horizontal Wet Venting for a Bathroom Group. (remaining text unchanged)

908.2.1 Vent Connection. The dry vent connection to the wet vent shall be an individual vent for the bidet, shower, or bathtub. One or two vented lavatory(s) shall be permitted to serve as a wet vent for a bathroom group. Only one wet-vented fixture drain or trap arm shall discharge upstream of the dry-vented fixture drain connection. Dry vent connections to the horizontal wet vent shall be in accordance with Section 905.2 and Section 905.3.

Exception: Dry vent connections to the horizontal wet vent shall be in accordance with Section 905.2 and Section 905.3.

(below shown for reference only)

905.2 Horizontal Drainage Pipe. Where vents connect to a horizontal drainage pipe, each vent pipe shall have its invert taken off above the drainage centerline of such pipe downstream of the trap being served.

905.3 Vent Pipe Rise. Unless prohibited by structural conditions, each vent shall rise vertically to a point not less than 6 inches (152 mm) above the flood-level rim of the fixture served before offsetting horizontally, and where two or more vent pipes converge, each such vent pipe shall rise to a point not less than 6 inches (152 mm) in height above the flood-level rim of the plumbing fixture it serves before being connected to any other vent. Vents less than 6 inches (152 mm) above the flood-level rim of the fixture shall be installed with approved drainage fittings, material, and grade to the drain.

SUBSTANTIATION:
The last sentence is really an exception to the rest of the section. This change will emphasize it is an exception.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposed change is not an exception, it is a requirement.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 908.2.5

SUBMITTER: Douglas Kirk
Self

RECOMMENDATION:
Revise text

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

908.0 Wet Venting.

908.2 Horizontal Wet Venting for a Bathroom Group. (remaining text unchanged)

908.2.5 Additional Fixtures. Additional fixtures shall discharge upstream or continuously vented. Only the fixtures within the bathroom group shall connect to the wet-vented horizontal branch.

SUBSTANTIATION:
The language is being modified to make it clear that continuously vented fixtures are allowed upstream or downstream of horizontally vented bathroom groups. See the below Figure 908.2A from UPC ITM for further clarification. Conventionally vented is not a code term, the correct term is continuously vented.
Proposals

Item #: 226

UPC 2024  Section: 913.0 – 913.10, Table 913.2

SUBMITTER: John Lansing  
PAE Consulting Engineers  
Rep. American Society of Plumbing Engineers

RECOMMENDATION:  
Revise text

**C 601.0-913.0 Single-Stack Vent System.**

**C 601.1-913.1 Where permitted.** Single-stack venting shall be designed by a registered design professional as an engineered design. A drainage stack shall be permitted to serve as a single-stack vent system where sized and installed in accordance with Section C 601.2-913.2 through Section C 601.9-913.10. The drainage stack and branch piping in a single-stack vent system shall provide for the flow of liquids, solids, and air without the loss of fixture trap seals exceeding the pressure differential described in Section 901.3.

**C 601.2-913.2 Stack Size.** Drainage stacks shall be sized in accordance with Table C 601.2-913.2. Not more than two water closets shall be permitted to discharge to a 3 inch (80 mm) stack. Stacks shall be uniformly sized based on the total connected drainage fixture unit load, with no reductions in size.

**C 601.2.1-913.2.1 Stack Vent.** The drainage stack vent shall have a stack vent of the same size terminating to the outdoors.

**C 601.3-913.3 Branch Size.** Horizontal branches connecting to a single-stack vent system shall be sized in accordance with Table 703.2.

**Exceptions:**

1. Not more than one water closet within 18 inches (457 mm) of the stack horizontally shall be permitted on a 3 inch (80 mm) horizontal branch.
2. A water closet within 18 inches (457 mm) of a stack horizontally and one other fixture with up to 1 ½ inch (40 mm) fixture drain size shall be permitted on a 3-inch (80 mm) horizontal branch where connected to the stack through a sanitary tee.

**C 601.4-913.4 Length of Horizontal Branches.** Water closets shall be not more than 4 feet (1219 mm) horizontally from the stack.

**Exception:** Water closets shall be permitted to be up to 8 feet (2438 mm) horizontally from the stack where connected to the stack through a sanitary tee.

**C 601.4.1-913.4.1 Other Fixtures.** Fixtures other than water closets shall be not more than 12 feet (3658 mm) horizontally from the stack.

**C 601.4.2-913.4.2 Length of Vertical Piping.** The length of vertical piping from a fixture trap to a horizontal branch shall not be considered in computing the fixture’s horizontal distance from the stack.

**C 601.5-913.5 Maximum Vertical Drops from Fixtures.** Vertical drops from fixture traps to horizontal branch piping shall be one size larger than the trap size, but not less than 2 inches (50 mm) in diameter. Vertical drops shall be 4 feet (1219 mm) maximum length. Fixture drains that are not increased in size, or have a vertical drop exceeding 4 feet (1219 mm) shall be individually vented.

**C 601.6-913.6 Additional Venting Required.** Additional venting shall be provided where more than one water closet is on a horizontal branch and where the distance from a fixture trap to the stack exceeds the limits in Section C 601.4-913.4. Where additional venting is required, the fixture(s) shall be vented by individual vents, common vents, wet vents, circuit vents, or a combination waste and vent pipe one of the methods described in Sections 908.0 through Section 911.5. The dry vent extensions for the additional venting shall connect to a branch vent, vent stack, stack vent, or be extended outdoors and terminate to the open air.

**C 601.7-913.7 Stack Offsets.** Where there are no fixture drain connections below a horizontal offset in a stack, the offset does not need to be vented. Where there are fixture drain connections below a horizontal offset in a stack, the offset shall be vented. There shall be no fixture connections to a stack within 2 feet (610 mm) above and below a horizontal offset.
913.8 Prohibited Connections Near Base of Stack Separate Stack Required. Where stacks are more than two stories 75 feet (22 860 mm) high, a separate stack shall be provided for the fixtures on the lower two stories. The stack for the lower two stories shall be permitted to be connected to the branch of the building drain that serves the stack for the upper stories at a point that is not less than 10 pipe diameters 8 feet (2438 mm) downstream from the base of the upper stack. Where stacks are less than 75 feet (22 860 mm) high but more than two stories high, the lowest story shall not connect within 8 feet (2438 mm) downstream from the base of the stack. Venting for the lowest story shall be provided in accordance with Section 913.8.1 and Section 913.8.2.

913.8.1 Conditional Vent. Venting of fixtures on the lowest floor shall be in accordance with Sections 908.0 through Section 911.5 and may connect into the single-stack as a conditional vent. The conditional vent connects into the stack by means of a wye-fitting to prevent ingress of drainage into the vent. No more than 12 drainage fixture units (DFU) may be connected into the conditional vent and shall connect not less than 8 feet (2438 mm) above the stack base.

913.8.2 Other Branch Vent. Other branch vents shall be vented in accordance with Sections 908.0 through Section 911.5.

913.9 Sizing Building Drains and Sewers. In a single-stack vent system, the building drain and branches thereof shall be sized in accordance with Table 703.2, and the building sewer shall be sized in accordance with Table 717.1.

913.10 Parallel Vent Stacks. Drainage stacks extending more than 75 feet (22 860 mm) shall be provided with a parallel vent stack and shall meet the requirements of Section 907.1 and Section 907.2.

<table>
<thead>
<tr>
<th>STACK SIZE (INCHES)</th>
<th>STACKS LESS THAN 75 FEET IN HEIGHT</th>
<th>STACK 75 FEET TO LESS THAN 160 FEET IN HEIGHT</th>
<th>STACK 160 FEET OR GREATER IN HEIGHT</th>
</tr>
</thead>
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<tr>
<td>3</td>
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</tr>
<tr>
<td>15</td>
<td>13 600</td>
<td>8100</td>
<td>4500</td>
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</tbody>
</table>

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm
* NP = Not permitted

SUBSTANTIATION:
By ensuring free airflow into the top of the single-stack, fixtures may discharge into the stack without individual vents between the fixture trap and stack connection. The restricted height and drainage flow ensure that airflow faces limited frictional resistance so as to operate within the ±1 inch of water column pressure tolerance at each trap location. Additionally, fixtures must be installed within a limited distance from the stack to eliminate issues of self-siphonage. Page 1 of the Supporting Document shows an example of the proposed single-stack next to a conventional stack sized according to UPC requirements. The ‘one-pipe’ system shown on page 2 of the Supporting Document, was developed in 1911 by Boston architect and plumbing innovator J. Pickering Putnam and was further tested and developed in the UK in the 1950s through experimental testing. The single-stack is now a standard sanitary drainage configuration throughout the UK and Europe, as well as Australia, Japan, Singapore, China, Brazil and many other regions. The single-stack is an approved method in roughly 50% of the United States by population and typical in Philadelphia. Testing has shown this method to match the performance of conventional vented drainage systems. Unlike the conventional sanitary stack in the UPC, all single-stacks must be extended to atmosphere above the highest sanitary branch connection. As can be seen on Page 3 of the Supporting Document, the single-stack has comparable performance to conventional stack, though the conventional stack in this test has a stack vent, which is not required in the UPC, though a parallel vent stack is required for buildings greater than 10 stories. The UPC incorporated the single stack into the Alternative Methods Appendix in the 2006 edition, 6 years before the IPC, but has yet to transition this to Chapter 9 as an approved method. Transitioning the single-stack vent system to the main body of the code will recognize this as a proven design method. In the attached document,
you can see an example of a single-stack design. Pressure flow profiles are shown below from Transient Airflow in Building Drainage Systems by Dr. John Swaffield, a researcher at Heriot-Watt University well known in the building drainage research field.

The single-stack system proposed here has key advantages over the single-stack configuration used on the East Coast and UPC appendix. The current single-stack vent system used in the US differs from international variations in that the lower two floors are required to connect to a separate stack, in essence, requiring a vent alongside the single-stack through the roof. It is well established in Europe and Asia that dedicated vent piping alongside stacks is unnecessary for midrise buildings and only an appropriate requirement for very tall stacks, such as those greater than 10 or so floors, where the developed negative pressure is potentially significant. It is also well accepted that separation of the lower two floors is unnecessary for stacks shorter than 75 feet in length and only recommended for stacks greater than 20 floors. The separation of the lower two floors is only required for stacks greater than 75 feet. Single-stacks used abroad additionally do not require separate vents for the lower floor to extend through the roof independently. Allowances are given to connect a vent from fixtures into the stack by means of a wye-fitting to prevent the ingress of drainage, as seen on page 4 of the Supporting Document. Other countries, such as the UK allow ‘stub stacks’ which rely on free airflow in the upper portion of the drainage system to relieve pressure differentials. Given that the standard allowable pressure differential variance of 1 inch of water column is shared by many drainage system specifications used internationally, performance between drainage systems can more easily be compared.

Conventional sanitary drainage requirements in the UPC make it difficult to drain all fixtures in a bathroom group to one stack, often requiring a dedicated stack for the bathtub or shower. This configuration will easily allow bathrooms to be served by one stack without dedicated vent piping. Firestopping and acoustical transmittance is reduced with fewer penetrations through each level. Midrise multifamily applications such as the podium style or ‘five-over-one’ buildings will see benefits in using the single-stack configuration, given the limited height.

A competing approach has become more common in the US, known as the Sovent system, which requires proprietary fittings containing an internal baffle to help maintain airflow through the stack. While Sovent will may produce superior airflow performance compared to the single-stack for very tall buildings, Sovent systems offer no advantages over the single-stack in terms for stacks in mid-rise buildings. The single-stack alternatively uses standard drainage fittings and offers comparable performance to Sovent systems, provided that the length of the stacks are limited to the heights specified in Table C 601.2.

Supporting document(s) has been provided to the Technical Committee for review.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
Single stack vent systems should remain in Appendix C as an engineered system. Section C 601.1 addresses single stack venting and shall be designed be a registered design professional. The Technical Committee recommends that the changes be resubmitted as a public comment to Appendix C without the relocation.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 24 NEGATIVE: 1 NOT RETURNED: 1 Daniels

EXPLANATION OF AFFIRMATIVE:

MATA: During the technical committee meeting, there was a significant amount of support expressed for incorporating the changes to the single stack vent system but retaining the section in Appendix C as an “engineered design.” The proponent intends to issue this as a recommendation in a public comment.

EXPLANATION OF NEGATIVE:

BALLANCO: Single stack venting can move from the appendix into Chapter 9. The system will still be designed by a registered design professional based on state licensing requirements.
C 601.0 Single-Stack Vent System.

C 601.1 Where permitted. Single-stack venting shall be designed by a registered design professional as an engineered design. A drainage stack shall be permitted to serve as a single-stack vent system where sized and installed in accordance with Section C 601.2 through Section C 601.9. The drainage stack and branch piping in a single-stack vent system shall provide for the flow of liquids, solids, and air without the loss of fixture trap seals exceeding the pressure differential described in Section 901.3.

C 601.2 Stack Size. Drainage stacks shall be sized in accordance with Table C 601.2. Not more than two water closets shall be permitted to discharge to a 3 inch (80 mm) stack. Stacks shall be uniformly sized based on the total connected drainage fixture unit load, with no reductions in size.

C 601.3 Branch Size. Horizontal branches connecting to a single-stack vent system shall be sized in accordance with Table 703.2.

Exceptions:  
(1) Not more than one water closet within 18 inches (457 mm) of the stack horizontally shall be permitted on a 3 inch (80 mm) horizontal branch.
(2) A water closet within 18 inches (457 mm) of a stack horizontally and one other fixture with up to 1 ½ inch (40 mm) fixture drain size shall be permitted on a 3-inch (80 mm) horizontal branch where connected to the stack through a sanitary tee.

C 601.4 Length of Horizontal Branches. Water closets shall be not more than 4 feet (1219 mm) horizontally from the stack.

Exception: Water closets shall be permitted to be up to 8 feet (2438 mm) horizontally from the stack where connected to the stack through a sanitary tee.

C 601.5 Length of Vertical Piping. The length of vertical piping from a fixture trap to a horizontal branch shall not be considered in computing the fixture's horizontal distance from the stack.

C 601.6 Additional Venting Required. Additional venting shall be provided where more than one water closet is on a horizontal branch and where the distance from a fixture trap to the stack exceeds the limits in Section C 601.4. Where additional venting is required, the fixture(s) shall be vented by individual vents, common vents, wet vents, circuit vents, or a combination waste and vent pipe—of one of the methods described in Sections 908.0 through Section 911.5. The dry vent extensions for the additional venting shall connect to a branch vent, vent stack, stack vent, or be extended outdoors and terminate to the open air.

C 601.7 Stack Offsets. Where there are no fixture drain connections below a horizontal offset in a stack, the offset does not need to be vented. Where there are fixture drain connections below a horizontal offset in a stack, the offset shall be vented. There shall be no fixture connections to a stack within 2 feet (610 mm) above and below a horizontal offset.

C 601.8 Prohibited Connections Near Base of Stack Separate Stack Required. Where stacks are more than two stories—75 feet (22 860 mm) high, a separate stack shall be provided for the fixtures on the lower two stories. The stack for the lower two stories shall be permitted to be connected to the branch of the building drain that serves the stack for the upper stories at a point that is not less than 10 pipe diameters 8 feet (2438 mm) downstream from the base of the upper stack. Where stacks are less than 75 feet (22 860 mm) high but more than two stories high, the lowest story shall not connect within 8 feet (2438 mm) downstream from the base of the stack. Venting for the lowest story shall be provided in accordance with Section C 601.8.1 and Section C 601.8.2.

C 601.9.1 Conditional Vent. Venting of fixtures on the lowest floor shall be in accordance with Sections 908.0 through Section 911.5 and may connect into the single-stack as a conditional vent. The conditional vent connects into the stack by means of a wye-fitting to prevent ingress of drainage into the vent. No more than 12 drainage fixture units (DFU) may be connected into the conditional vent and shall connect not less than 8 feet (2438 mm) above the stack base.
C 601.8.2 Other Branch Vent. Other branch vents shall be vented in accordance with Sections 908.0 through Section 911.5.

C 601.9 Sizing Building Drains and Sewers. In a single-stack vent system, the building drain and branches thereof shall be sized in accordance with Table 703.2, and the building sewer shall be sized in accordance with Table 717.1.

C 601.10 Parallel Vent Stacks. Drainage stacks extending more than 75 feet (22 860 mm) shall be provided with a parallel vent stack and shall meet the requirements of Section 907.1 and Section 907.2.

### TABLE C 601.2
SINGLE STACK SIZE*

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<td>480</td>
<td>225</td>
<td>24</td>
</tr>
<tr>
<td>6</td>
<td>1015</td>
<td>480</td>
<td>225</td>
</tr>
<tr>
<td>8</td>
<td>2320</td>
<td>1015</td>
<td>480</td>
</tr>
<tr>
<td>10</td>
<td>4500</td>
<td>2320</td>
<td>1015</td>
</tr>
<tr>
<td>12</td>
<td>8100</td>
<td>4500</td>
<td>2320</td>
</tr>
<tr>
<td>15</td>
<td>13 600</td>
<td>8100</td>
<td>4500</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm  
* NP = Not permitted

**SUBSTANTIATION:**
Recommend retaining Section 601.0 in Appendix C and incorporate the proposed revisions of the original Item #226. The first sentence of Section C 601.1, "Single-stack venting shall be designed by a registered design professional as an engineered design" is proposed to be retained within this section.

Incorporating proposal in Appendix C rather than in the body of the code and retain the requirement for this method to be an engineered design.
Proposals

Item #: 228
UPC 2024 Section: Table 1002.2

SUBMITTER: John Lansing
PAE Consulting Engineers
Rep. American Society of Plumbing Engineers

RECOMMENDATION:
Revise text

TABLE 1002.2
HORIZONTAL LENGTHS OF TRAP ARMS
(EXCEPT FOR WATER CLOSETS AND SIMILAR FIXTURES)\(^1, 2, 3\)

<table>
<thead>
<tr>
<th>TRAP ARM PIPE DIAMETER (inches)</th>
<th>DISTANCE TRAP TO VENT MINIMUM (inches)</th>
<th>LENGTH MAXIMUM (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1¼</td>
<td>2½</td>
<td>30</td>
</tr>
<tr>
<td>1½</td>
<td>3</td>
<td>42</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>72</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>120</td>
</tr>
<tr>
<td>Exceeding 4</td>
<td>2 x Diameter</td>
<td>120</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25.4 mm

Notes:
1. Maintain 1/4 inch per foot slope (20.8 mm/m).
2. The developed length between the trap of a water closet or similar fixture (measured from the top of the closet flange to the inner edge of the vent) and its vent shall not exceed 6 feet (1829 mm).
3. Horizontally wet vented bathtubs, showers and similar fixtures shall be limited to a maximum of 6 feet (1830 mm) for 1-1/2 inch (40 mm) fixture drains and 8 feet (2440 mm) for 2 inch (50 mm) fixture drains, maintaining ¼ inch per foot slope (20 mm/m).

SUBSTANTIATION:
Since the introduction of horizontal wet venting in the 2009 Uniform Plumbing Code, many installations feature roundabout piping configurations in order to meet the maximum 3'-6" trap-to-vent distance from the bathtub, as required in Table 1002.2 for 1-1/2 inch fixture drains. We believe that the trap-to-vent requirement was mistakenly incorporated into the code language, given that the original conclusions from the National Bureau of Standards analysis and experimental testing on horizontal wet venting recommended greater allowances for trap arm lengths. The National Bureau of Standards, which originally helped produce many of the tables and recommendations in the UPC regarding sanitary drainage and vent systems, investigated horizontal wet vent systems to verify performance for the inclusion into plumbing codes. Their report, BMS 119 Wet Venting of Plumbing Fixtures, found that a 1-1/2 inch bathtub drain sloped at 1/4-inch per foot may have a length of 6'-0" between the horizontal wet vent (from the lavatory) and trap weir of the bathtub while maintaining within the required ±1 inch of water column pressure differential at the fixture trap to mitigate self-siphonage conditions. They also found that increasing the diameter of the fixture drain from the bathtub to 2 inches allowed a distance of 8'-0". Recognizing the rest of the conclusions...
from the original work of the NBS on wet venting will reduce unnecessary horizontal piping and increase drainline performance while optimizing the use of drainage piping. The additional piping installed to meet current code requirements does not add value to the drainage system, consequently increasing the cost, materials, and complexity of the installation. The impact of extending the maximum bathtub/shower trap arm length is substantial for multi-family applications utilizing wet vent configurations, allowing bathrooms to more easily be served by one sanitary stack, particularly in wood-frame construction where horizontal runs are more challenging. An example schematic and installation photo is provided in the attached document as well as supporting data from BMS 119. We recommend including the revised values as a footnote under Table 1002.2.
EXAMPLE OF CURRENT INSTALLATION

BATHTUB FIXTURE DRAIN INCREASED FROM 1-1/2 INCH TO 2 INCH TO COMPLY WITH CURRENT REQUIREMENTS

WET VENT FROM LAVATORY RUNS TOWARD THE BATHTUB FIXTURE DRAIN TO COMPLY WITH CURRENT REQUIREMENTS

6-story mixed-use building in Portland, OR
COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
There is a concern that the vent opening will be below the trap weir.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 20  NEGATIVE: 5  NOT RETURNED: 1  Daniels

EXPLANATION OF NEGATIVE:

BALLANCO: This was a good change that appeared to be misunderstood. The proponent was attempting to identify the lengths that are appropriate.

KREITENBERG: Agree with Julius Ballanco.

MATA: A drain sloped at ¼-inch per foot will have a change in elevation by 1.5-inches over a run of 6.0 feet and 2.0-inches over a run of 8 feet. Therefore, the trap-to-vent distances proposed will not be located below the trap weir.

NIELSEN: I think it is a good proposed change and substantiation.

WHITE: I agree with the proponent's substantiation and the NBS research.
Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Table 1002.2  

SUBMITTER: John Lansing  
PAE Consulting Engineers  
Rep. American Society of Plumbing Engineers

Item #: 228  
Comment #: 1

RECOMMENDATION: 
Revise text

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

SUBSTANTIATION: 
The values suggested by Mr. Mata are correct and match the recommendations from the NBS testing. The concern raised about the diameter variance from the from the nominal thickness (0.04-inch for 2-inch diameter cast iron drain) is addressed in the original proposal and will match the predicted performance because the NBS testing apparatus used commercially available drainage piping which also features small variances between the nominal diameter. More importantly, these values were a general recommendation; in the event that the installation lengths are exceeded by several inches, integrity of the trap seal would not be compromised by self-siphonage.
Proposals

Item #: 236

UPC 2024 Section: 1009.1, Table 1009.1, Table 1701.1, Table 1701.2

SUBMITTER: Shane Peters  
City of Santa Monica

RECOMMENDATION:  
Revise text

1009.0 Interceptors (Clarifiers) and Separators.  
1009.1 Where Required. Interceptors (clarifiers) (including grease, oil, sand, solid interceptors, etc.) shall be required by the Authority Having Jurisdiction where they are necessary for the proper handling of liquid wastes containing grease, flammable wastes, sand, solids, acid or alkaline substances, or other ingredients harmful to the building drainage system, the public or private sewer, or to public or private sewage disposal. A list of acceptable interceptor standards is referenced in Table 1009.1.

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>STANDARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grease, Non-petroleum Oil</td>
<td>ASME A112.14.6, PDI G-102</td>
</tr>
<tr>
<td>Solid Waste</td>
<td>IAPMO IGC 167</td>
</tr>
<tr>
<td>Non-petroleum Oil</td>
<td>IAPMO PS 80</td>
</tr>
<tr>
<td>Petroleum Oil</td>
<td>ASTM D6104, IAPMO IGC 183, IAPMO IGC 325</td>
</tr>
</tbody>
</table>

**TABLE 1009.1**  
APPROVED INTERCEPTORS (CLARIFIERS)

**TABLE 1701.1**  
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM D6104-1997 (R2011)</td>
<td>Determining the Performance of Oil/Water Separators Subjected to Surface Run-Off</td>
<td>Interceptors</td>
<td>Table 1009.1</td>
</tr>
<tr>
<td>IAPMO IGC 167-2011e2 (R2021)</td>
<td>Solid Waste Containment Interceptors</td>
<td>Interceptors</td>
<td>Table 1009.1</td>
</tr>
<tr>
<td>IAPMO IGC 183-2016</td>
<td>Oil/Water Separators and Coalescing Plate Separators</td>
<td>Interceptors</td>
<td>Table 1009.1</td>
</tr>
<tr>
<td>IAPMO IGC 325-2016</td>
<td>Oil/Water Separators Performance</td>
<td>Interceptors</td>
<td>Table 1009.1</td>
</tr>
<tr>
<td>IAPMO PS 80-2019</td>
<td>Clarifiers</td>
<td>Interceptors</td>
<td>Table 1009.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 183-2016</td>
<td>Oil/Water Separators and Coalescing Plate Separators</td>
<td>DWV Components</td>
</tr>
<tr>
<td>IAPMO PS 80-2008</td>
<td>Clarifiers</td>
<td>DWV Components</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
There are no guidance to acceptable standards for different type of interceptors in the UPC. This is a list of approved interceptor standards categorized by application. There are many types of interceptors and this list will help the end user select the appropriate type for the specific use.

COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC

Amend proposal as follows:

1009.0 Interceptors (Clarifiers) and Separators.
1009.1 Where Required. Interceptors (clarifiers) (including grease, oil, sand, solid interceptors, etc.) shall be required by the Authority Having Jurisdiction where they are necessary for the proper handling of liquid wastes containing grease, flammable wastes, sand, solids, acid or alkaline substances, or other ingredients harmful to the building drainage system, the public or private sewer, or to public or private sewage disposal. A list of acceptable interceptor standards is referenced in Table 1009.1.

TABLE 1009.1
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</tr>
<tr>
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REFERENCED STANDARDS

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<td>Interceptors</td>
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<td>Interceptors</td>
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</tr>
<tr>
<td>IAPMO PS 80-2019</td>
<td>Clarifiers</td>
<td>Interceptors</td>
<td>Table 1009.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

COMMITTEE STATEMENT:
The modification removes the duplicate interceptor category row and relocates the standards to the separate interceptor categories that are addressed by each of the standards.
TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024 UPC Section #: Table 1009.1 Item #: 236
SUBMITTER: Max Weiss Plumbing and Drainage Institute

RECOMMENDATION:
Revise text
Request to accept the code change proposal as modified by this public comment.

TABLE 1009.1
APPROVED INTERCEPTORS (CLARIFIERS)

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<th>STANDARD</th>
</tr>
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<td>IAPMO IGC 167</td>
</tr>
<tr>
<td>Non-petroleum Oil</td>
<td>ASME A112.14.6, IAPMO PS 80, PDI G-102</td>
</tr>
<tr>
<td>Petroleum Oil</td>
<td>ASTM D6104, IAPMO IGC 183, IAPMO IGC 325</td>
</tr>
</tbody>
</table>

SUBSTANTIATION:
"FOG" (Fats, Oils, Grease) is the correct contemporary nomenclature for the intended intercepted substance in its three physical manifestations. "Grease" alone, is a vernacular term.

PUBLIC COMMENT 2
Code Year: 2024 UPC Section #: Table 1009.1 Item #: 236
SUBMITTER: Gabe Ismert Striem

RECOMMENDATION:
Revise text
Request to accept the code change proposal as modified by this public comment.

TABLE 1009.1
APPROVED INTERCEPTORS (CLARIFIERS)

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>STANDARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Waste</td>
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</tr>
<tr>
<td>Non-petroleum Oil</td>
<td>ASME A112.14.6, IAPMO PS 80, PDI G-102</td>
</tr>
<tr>
<td>Petroleum Oil</td>
<td>ASTM D6104, IAPMO IGC 183, IAPMO IGC 325</td>
</tr>
</tbody>
</table>
The duplicate interceptor category "Grease, Non-petroleum oil" was already removed (agreed). There appears to be a third duplicate, "Non-petroleum oil." Is this category necessary? If so, what are the real-life applications of this category?

ASME A112.14.6 and PDI G-102 are already listed in "Grease."

IAPMO PS-80 is not tied to a specific application (uses general terms like clarifier and interceptor), and therefore should be reviewed and deemed if necessary to be included in this table.
Proposals

Item #: 239
UPC 2024  Section: 1014.3.5

SUBMITTER: Karan Kapila
           Self

RECOMMENDATION:
Revise text

1014.0 Grease Interceptors.

1014.3 Gravity Grease Interceptors. (portions of text not shown remain unchanged)

1014.3.5 Construction Requirements. Gravity grease interceptors shall be designed to remove grease from effluent and shall be sized in accordance with this section. Gravity grease interceptors shall also be designed to retain grease until accumulations can be removed by pumping the interceptor. It is recommended that Where required, a sample box is shall be located at the outlet end of gravity grease interceptors so that the Authority Having Jurisdiction can periodically sample effluent quality.

SUBSTANTIATION:
The term "recommended" is not enforceable. The language is being updated to make the provisions for sample box a requirement when required by the Authority Having Jurisdiction.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The change is overly restrictive as a sample box is not necessary for taking samples. The change may be misinterpreted to mean that such sample boxes are required.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS:  AFFIRMATIVE: 25   NOT RETURNED: 1   Daniels

Appendixed Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 1014.3.5  
SUBMITTER: Douglas Kirk
           Self

RECOMMENDATION:
Revise text

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

1014.0 Grease Interceptors.

1014.3 Gravity Grease Interceptors. (remaining text unchanged)
1014.3.5 Construction Requirements. Gravity grease interceptors shall be designed to remove grease from effluent and shall be sized in accordance with this section. Gravity grease interceptors shall also be designed to retain grease until accumulations can be removed by pumping the interceptor. It is recommended that When provided, a sample box is shall be located at the outlet end of gravity grease interceptors so that the Authority Having Jurisdiction can periodically sample effluent quality.

SUBSTANTIATION:
The rejection stated the previous submission was overly restrictive and that a sample box was not necessary for taking sample.

I again submit that the term "recommended" is not enforceable and needs to be stricken or replaced. The language being amended deletes the term "recommended" to "when provided" and fixes the location of the sample box when one is provided.
1017.0 Oil and Flammable Liquid Interceptors.  

1017.1 Interceptors Required. Repair garages and gasoline stations with grease racks or grease pits, and factories that have oily, flammable, or both types of wastes as a result of manufacturing, storage, maintenance, repair, or testing processes, shall be provided with an oil or flammable liquid interceptor, that shall be connected to necessary floor drains in such locations shall be connected directly to oil and flammable liquid interceptors.  

1017.2 Interceptor Design Alternatives. Oil interceptors shall comply with IAPMO IGC 183 or be in accordance with Section 1017.3 through Section 1017.4.  

1017.3 Interceptor Details. Oil and flammable liquid interceptors shall be in accordance with the following:  

1. The separation or vapor compartment shall be independently vented to the outer air. Where two or more separation or vapor compartments are used, each shall be vented to the outer air or shall be permitted to connect to a header that is installed at a minimum of 6 inches (152 mm) above the spill line of the lowest floor drain and vented independently to the outer air.  

2. The minimum size of a flammable vapor vent shall be not less than 2 inches (50 mm), and, where vented through a sidewall, the vent shall be not less than 10 feet (3048 mm) above the adjacent level at an approved location.  

3. The interceptor shall be vented on the sewer side and shall not connect to a flammable vapor vent. Oil and flammable interceptors shall be provided with gastight cleanout covers that shall be readily accessible.  

4. The waste line shall be not less than 3 inches (80 mm) in diameter with a full-size cleanout to grade.  

5. Where an interceptor is provided with an overflow, it shall be provided with an overflow line [not less than 2 inches (50 mm) in diameter] to an approved waste oil tank having a minimum capacity of 550 gallons (2082 L) and meeting the requirements of the Authority Having Jurisdiction.  

(a) The waste oil from the separator shall flow by gravity or shall be pumped to a higher elevation by an automatic pump.  

(b) Pumps shall be adequately sized and accessible.  

(c) Waste oil tanks shall have a 2 inch (50 mm) minimum pump-out connection at grade and an 11/2 inch (40 mm) minimum vent to atmosphere at an approved location not less than 10 feet (3048 mm) above grade.  

4017.21017.4 Design of Interceptors. Each manufactured interceptor that is rated shall be stamped or labeled by the manufacturer with an indication of its full discharge rate in gpm (L/s). The following shall apply:  

1. The full discharge rate to such an interceptor shall be determined at full flow. Each interceptor shall be rated equal to or greater than the incoming flow and shall be provided with an overflow line to an underground tank.  

2. Interceptors not rated by the manufacturer shall have a depth of not less than 2 feet (610 mm) below the invert of the discharge drain. The outlet opening shall have not less than 18 inch (457 mm) water seal and shall have a minimum capacity as follows:  

(a) Where not more than three motor vehicles are serviced, stored, or both, interceptors shall have a minimum capacity of 6 cubic feet (0.2 m³), and 1 cubic foot (0.03 m³) of capacity shall be added for each vehicle up to 10 vehicles.  

(b) Above 10 vehicles, the Authority Having Jurisdiction shall determine the size of the interceptor required.  

(c) Where vehicles are serviced and not stored, interceptor capacity shall be based on a net capacity of 1
cubic foot (0.03 m$^3$) for each 100 square feet (9.29 m$^2$) of the surface to be drained into the interceptor, with a minimum of 6 cubic feet (0.2 m$^3$).

TABLE 1701.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 183-2016</td>
<td>Oil/Water Separators and Coalescing Plate Separators</td>
<td>Interceptor</td>
<td>1017.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: IAPMO IGC 183 meets the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 183-2016</td>
<td>Oil/Water Separators and Coalescing Plate Separators</td>
<td>DWV Components</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
The proposed standard is not intended to replace the current provisions for Oil Separators. It gives the end user an option for this type of interceptor. This standard covers oil/water separators and coalescing plate separators designed to remove petroleum based oils from storm or process water and specifies requirements for materials, physical characteristics, performance testing, and markings. Oil/Water separators covered by this standard shall be designed to separate oils and solids having different specific gravities than water. The separators shall retain the oil until accumulations can be removed.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 1017.3 Item #: 240

SUBMITTER: Gabe Ismert Striem Comment #: 1

RECOMMENDATION:
Revise text

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

1017.0 Oil and Flammable Liquid Interceptors.

1017.3 Interceptor Details. Oil and flammable liquid interceptors shall be in accordance with the following:
(1) The separation or vapor compartment shall be independently vented to the outer air. Where two or more separation or vapor compartments are used, each shall be vented to the outer air or shall be permitted to connect to a header that is installed at a minimum of 6 inches (152 mm) above the spill line of the lowest floor drain and vented independently to the outer air.
(2) The minimum size of a flammable vapor vent shall be not less than 2 inches (50 mm), and, where vented through a sidewall, the vent shall be not less than 10 feet (3048 mm) above the adjacent level at an approved location.
(3) The interceptor shall be vented on the sewer side and shall not connect to a flammable vapor vent. Oil and flammable interceptors shall be provided with gastight cleanout covers that shall be readily accessible.

(4) The waste line shall be not less than 3 inches (80 mm) in diameter with a full-size cleanout to grade.

(5) Where an interceptor is provided with an overflow, it shall be provided with an overflow line [not less than 2 inches (50 mm) in diameter] to an approved waste oil tank having a minimum capacity of 550 gallons (2082 L) and meeting the requirements of the Authority Having Jurisdiction.

(a) The waste oil from the separator shall flow by gravity or shall be pumped to a higher elevation by an automatic pump.

(b) Pumps shall be adequately sized and accessible.

(c) Waste oil tanks shall have a 2 inch (50 mm) minimum pump-out connection at grade and a 1 1/2 inch (40 mm) minimum vent to atmosphere at an approved location not less than 10 feet (3048 mm) above grade.

SUBSTANTIATION:
Section 1017.3(5) does not represent a real-world application. Further, the option of an interceptor with an overflow and thus a 550-gallon waste oil tank requirement is an unnecessary risk for soil contamination and potential catastrophic EPA fines for the building owner. Oil should not sit stagnant in a holding tank (overflow tank).

Flow-through oil interceptors (inlet, outlet and a vent), covered in the remaining parts of Section 1017.0, undergo routine maintenance via pumper truck contractors, and do not house stagnant oil. Due to routine maintenance, the integrity of the interceptor is seen often, and a report of damage or wear is made to the AHJ or owner if necessary. Even if the 550-gallon waste oil tank had a high-level alarm (which code does not require), and there’s a leak in the tank due to a corrosive or porous material of construction (oil in the soil), the alarm would never sound; thus maintenance would never be carried out as oil continued to leach into the native soil.

PUBLIC COMMENT 2

Code Year: 2024 UPC  Section #: 1017.4  Item #: 240

SUBMITTER: Gabe Ismert  Comment #: 2

Striem

RECOMMENDATION:
Revise text

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

1017.0 Oil and Flammable Liquid Interceptors.

1017.4 Design of Interceptors. Each manufactured interceptor that is rated shall be stamped or labeled by the manufacturer with an indication of its full discharge rate in gpm (L/s). The following shall apply:

(1) The full discharge rate to such an interceptor shall be determined at full flow. Each interceptor shall be rated equal to or greater than the incoming flow, and shall be provided with an overflow line to an underground tank.

(2) Interceptors not rated by the manufacturer shall have a depth of not less than 2 feet (610 mm) below the invert of the discharge drain. The outlet opening shall have not less than an 18 inch (457 mm) water seal and shall have a minimum capacity as follows:

(a) Where not more than three motor vehicles are serviced, stored, or both, interceptors shall have a minimum capacity of 6 cubic feet (0.2 m$^3$), and 1 cubic foot (0.03 m$^3$) of capacity shall be added for each vehicle up to 10 vehicles.

(b) Above 10 vehicles, the Authority Having Jurisdiction shall determine the size of the interceptor required.

(c) Where vehicles are serviced and not stored, interceptor capacity shall be based on a net capacity of 1 cubic foot (0.03 m$^3$) for each 100 square feet (9.29 m$^2$) of the surface to be drained into the interceptor, with a minimum of 6 cubic feet (0.2 m$^3$).

SUBSTANTIATION:
Per my previous comment / form substitution on Section 1017.3, note (5) a), b) and c) - the above text should be removed as it would no longer apply.
Proposals

Item #: 241
UPC 2024  Section: 1102.2

SUBMITTER: Karan Kapila
Self

RECOMMENDATION:
Revise text

1102.0 Roof Drains.

1102.2 Dome Strainers Required. Primary and secondary Rroof drains shall have domed strainers.

SUBSTANTIATION:
The question is often asked whether the secondary drain requires a strainer. The addition of the language will clarify the intent of the strainer requirement for both primary and secondary drains.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
Not all secondary roof drains require a strainer. No technical justification was provided to warrant such change.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024 UPC  Section #: 1101.13.1

SUBMITTER: Adam Segura
Self

RECOMMENDATION:
Revise text

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

1101.0 General.

1101.13 Cleanouts. Cleanouts for building storm drains shall comply with the requirements of Section 719.0 of this code.

1101.13.1 Rain Leaders and Conductors. Rain leaders and conductors connected to a building storm sewer shall have a cleanout installed at the base of the outside leader or outside inside conductor before it connects to the horizontal drain.
SUBSTANTIATION:
This comment attempts to address another clarification regarding storm drains and their installation requirements.

The UPC defines a conductor is “A pipe inside the building that conveys storm water from the roof to a storm drain, combined building sewer, or other approved point of disposal.” Section 1101.13.1 needs to be updated to indicate that the conductor is “inside.” Furthermore, it will clarify that a cleanout is required at the base of the outside leader, or at the base of the inside conductor.
Proposals

**Item #: 242**

UPC 2024  Section: 1102.4, Table 1701.1

**SUBMITTER:** Julius Ballanco, P.E.
JB Engineering and Code Consulting, P.C.

**RECOMMENDATION:**
Add new text

**1102.0 Roof Drains.**

**1102.4 Roof Drain Flow Rate.** The flow rate through an atmospheric roof drain shall be determined by testing to ASPE/IAPMO Z1034 or ASME A112.6.4. The flow rate through a siphonic roof drain shall be determined by testing to ASME A112.6.9.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASPE/IAPMO Z1034-2015(R2020)</td>
<td>Test Method For Evaluating Roof Drain Performance</td>
<td>Roof Drain</td>
<td>1102.4</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: ASME A112.6.4, ASME A112.6.9, and ASPE/IAPMO Z1034 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

**SUBSTANTIATION:**
This proposed change will require roof drains to be tested for flow rate in accordance with one of three standards. The first standard, ASPE/IAPMO Z1034, is the most commonly used test method for determining flow rate through a roof drain. ASME A112.6.4 flow rate test method is in draft form at the time this code change is submitted. If the updated standard is not complete, the reference to ASME A112.6.4 should be deleted. ASME A112.6.9 includes a test method for siphonic roof drains.

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**
The flow rates for siphonic roof drains should be part of an engineered design. Additionally, ASME A112.6.4 does not contain flow rate requirements.

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 24  ABSTAIN: 1  NOT RETURNED: 1  Daniels

**EXPLANATION OF ABSTAIN:**
**BALLANCO:** As the proponent of this code change, I am abstaining to avoid any perceived conflict of interest.

---

**Appended Comments**
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 1102.4, Table 1701.1

SUBMITTER: Julius Ballanco, P.E.
JB Engineering and Code Consulting, P.C.
Rep. Self

RECOMMENDATION:
Add new text

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

1102.0 Roof Drains.

1106.0 Engineered Storm Drainage System.

1102.4 1106.4 Roof Drain Flow Rate. The flow rate through an atmospheric roof drain shall be determined by testing to ASPE/IAPMO Z1034. The flow rate through a siphonic roof drain shall be determined by testing to ASME A112.6.9.

TABLE 1701.1
REFERENCE STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASPE/IAPMO Z1034-2015(R2020)</td>
<td>Test Method For Evaluating Roof Drain Performance</td>
<td>Roof Drain</td>
<td>1102.4</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: ASPE/IAPMO Z1034 meets the requirements for a mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
The Technical Committee is correct that ASME A112.6.4 does not have any testing requirements to determine flow rate through a roof drain. Therefore, the reference to ASME A112.6.4 has been removed. The proposed addition of these requirements have yet to be approved.

The Technical Committee also suggested that this section belongs in the engineered roof drainage section. The modification to the Section number will move this requirement to the engineered roof drainage section.
Proposals

Item #: 244
UPC 2024  Section: 1106.4, C 701.0 - C 701.6

SUBMITTER: Julius Ballanco, P.E.
JB Engineering and Code Consulting, P.C.
Rep. Self

RECOMMENDATION:
Add new text

1106.0 Engineered Storm Drainage System.

1106.4 Alternative Engineered Roof Drainage Design. Alternative engineered roof drainage systems shall be designed in accordance with Section C 701.1.

APPENDIX C
ALTERNATE PLUMBING SYSTEMS

C 701.0 Alternative Engineered Roof Drainage Design.
C 701.1 General. The roof drainage system shall be sized as a system in accordance with Section C 701.2 or Section C 701.3. The piping sizing shall be designed to accommodate the rainfall rates specified in Table D 101.1.
C 701.2 Roof Drainage Table Method. The rainwater drainage flow rate from the roof surface shall be determined based on the rainfall rate of a 60 minute storm with a 100 year return period and the area of the roof being drained in accordance with Table C 701.2.
C 701.2.1 Roof Drain. The discharge flow rate for the roof drain shall be the manufacturer’s published discharge flow rate based for a head height of 2 inches to 4 inches (51 mm to 102 mm) at the strainer. Roof drainage piping shall be sized in accordance with Tables C 701.4 through C 701.6.
C 701.2.2 Secondary Roof Drainage. The opening for the secondary roof drainage shall be not less than 2 inches (51 mm) and not more than 4 inches (102 mm) above the bottom opening of the primary roof drain. The secondary roof drainage system shall comply with Section 1101.12.2.
C 701.3 Engineered Roof Drain Flow Rate. The flow rate used for sizing the roof drainage piping shall be based on the maximum anticipated ponding at the roof drain based on a rainfall rate of a 60 minute storm with a 100 year return period and a 5 minute storm with a 10 year return period. The roof drain shall be sized for the anticipated flow rate. The roof drainage piping shall be sized in accordance with Section C 701.4 through Section C 701.6 for the anticipated flow rate.
C 701.3.1 Secondary Roof Drain. The discharge through the secondary roof drain shall not be considered where establishing the maximum height of ponding at the primary roof drain. The opening for the secondary roof drainage shall be not less than 2 inches (51 mm) above the bottom opening of the primary roof drain. The secondary roof drainage system shall comply with Section 1101.12.2.
### TABLE C 701.2
ROOF DRAINAGE FLOW RATE

<table>
<thead>
<tr>
<th>Roof Drainage Area (sq ft)</th>
<th>Drainage Flow Rate (gpm) Based on Rainfall Rates (in/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>500</td>
<td>5</td>
</tr>
<tr>
<td>1000</td>
<td>10</td>
</tr>
<tr>
<td>1500</td>
<td>16</td>
</tr>
<tr>
<td>2000</td>
<td>21</td>
</tr>
<tr>
<td>2500</td>
<td>26</td>
</tr>
<tr>
<td>3000</td>
<td>31</td>
</tr>
<tr>
<td>3500</td>
<td>36</td>
</tr>
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<td>4500</td>
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</tr>
<tr>
<td>5000</td>
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<tr>
<td>5500</td>
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<td>6500</td>
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<td>7000</td>
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<td>8000</td>
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<td>8500</td>
<td>88</td>
</tr>
<tr>
<td>9000</td>
<td>94</td>
</tr>
<tr>
<td>10 000</td>
<td>104</td>
</tr>
<tr>
<td>11 000</td>
<td>114</td>
</tr>
<tr>
<td>12 000</td>
<td>125</td>
</tr>
</tbody>
</table>

For SI units: 1 square foot = 0.0929 m², 1 inch per hour = 25.4 mm/h, 1 gallon per minute = 0.06 L/s

### C 701.4 Sizing Roof Drainage Piping
Vertical and horizontal roof drainage piping shall be sized to receive the discharge from the roof drain(s), and in accordance Table C 701.4.

### TABLE C 701.4
ROOF DRAINAGE PIPE SIZING

<table>
<thead>
<tr>
<th>Pipe Size (inch)</th>
<th>Maximum Permitted Flow Rate (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vertical Drain</td>
</tr>
<tr>
<td></td>
<td>1/16</td>
</tr>
<tr>
<td>2</td>
<td>34</td>
</tr>
<tr>
<td>3</td>
<td>87</td>
</tr>
<tr>
<td>4</td>
<td>180</td>
</tr>
<tr>
<td>5</td>
<td>311</td>
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<tr>
<td>6</td>
<td>538</td>
</tr>
<tr>
<td>8</td>
<td>1117</td>
</tr>
<tr>
<td>10</td>
<td>2050</td>
</tr>
<tr>
<td>12</td>
<td>3272</td>
</tr>
<tr>
<td>15</td>
<td>5543</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm, 1 inch per foot = 83.3 mm/m, 1 gallon per minute = 0.06 L/s
**C 701.5 Sizing Conductors and Leaders.** Conductors and leaders shall be in accordance with Table C 701.5.

<table>
<thead>
<tr>
<th>Size of Conductor or Leader (inch)</th>
<th>Maximum Permitted Flow Rate (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>2 x 2</td>
<td>30</td>
</tr>
<tr>
<td>1½ x 2½</td>
<td>30</td>
</tr>
<tr>
<td>2½</td>
<td>54</td>
</tr>
<tr>
<td>2½ x 2½</td>
<td>54</td>
</tr>
<tr>
<td>3</td>
<td>92</td>
</tr>
<tr>
<td>2 x 4</td>
<td>92</td>
</tr>
<tr>
<td>2½ x 3</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>192</td>
</tr>
<tr>
<td>3 x 4½</td>
<td>192</td>
</tr>
<tr>
<td>3½ x 4</td>
<td>192</td>
</tr>
<tr>
<td>5</td>
<td>360</td>
</tr>
<tr>
<td>4 x 5</td>
<td>360</td>
</tr>
<tr>
<td>4½ x 4½</td>
<td>360</td>
</tr>
<tr>
<td>6</td>
<td>563</td>
</tr>
<tr>
<td>5 x 6</td>
<td>563</td>
</tr>
<tr>
<td>5½ x 5½</td>
<td>563</td>
</tr>
<tr>
<td>8</td>
<td>1208</td>
</tr>
<tr>
<td>6 x 8</td>
<td>1208</td>
</tr>
</tbody>
</table>

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

**C 701.6 Sizing Gutters.** Gutters shall be sized based on the flow rate from the roof surface and in accordance with Table C 701.6.

<table>
<thead>
<tr>
<th>Diameter of Gutter (inches)</th>
<th>Slope (in/ft)</th>
<th>Capacity (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1½ x 2½</td>
<td>1/4</td>
<td>26</td>
</tr>
<tr>
<td>1½ x 2½</td>
<td>1/2</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>1/8</td>
<td>39</td>
</tr>
<tr>
<td>2½ x 3</td>
<td>1/4</td>
<td>55</td>
</tr>
<tr>
<td>2½ x 3</td>
<td>1/2</td>
<td>87</td>
</tr>
<tr>
<td>5</td>
<td>1/8</td>
<td>74</td>
</tr>
<tr>
<td>4 x 2½</td>
<td>1/4</td>
<td>106</td>
</tr>
<tr>
<td>3 x 3½</td>
<td>1/2</td>
<td>156</td>
</tr>
<tr>
<td>6</td>
<td>1/8</td>
<td>110</td>
</tr>
<tr>
<td>3 x 5</td>
<td>1/4</td>
<td>157</td>
</tr>
<tr>
<td>3 x 5</td>
<td>1/2</td>
<td>225</td>
</tr>
<tr>
<td>8</td>
<td>1/16</td>
<td>172</td>
</tr>
<tr>
<td>8</td>
<td>1/8</td>
<td>247</td>
</tr>
<tr>
<td>4½ x 6</td>
<td>1/4</td>
<td>348</td>
</tr>
<tr>
<td>4½ x 6</td>
<td>1/2</td>
<td>494</td>
</tr>
<tr>
<td>10</td>
<td>1/16</td>
<td>331</td>
</tr>
<tr>
<td>10</td>
<td>1/8</td>
<td>472</td>
</tr>
<tr>
<td>5 x 8</td>
<td>1/4</td>
<td>651</td>
</tr>
<tr>
<td>4 x 10</td>
<td>1/2</td>
<td>1055</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm, 1 inch per foot = 83.3 mm/m, 1 gallon per minute = 0.06 L/s
SUBSTANTIATION:
This sizing method is being added to the engineered sizing section in Appendix C. This sizing method is being used by the plumbing engineers since the publication of the paper by the ASPE Research Foundation.

ASPE Research Foundation and IAPMO cosponsored research on the performance of roof drains in storm drainage system. The code change is consistent with the recommendations in the ASPE RF report. The research report states the problem and the justification for this change. The research report can be downloaded at no cost at www.aspe.org.

The only difference between this change and the recommendation in the ASPE RF report is the first methodology for sizing a storm drainage system in proposed Section C 701.1. These requirements were developed by the Storm Drainage Task Group. While the Task Group did not vote to bring these forward, it was thought that in the best interest of code development, the proposed text would be included. This first method is a cook book method for designing a storm drainage system.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The new Section 1106.4 may imply that the proposed sections for Appendix C are considered mandatory. The concern is that not all jurisdictions adopt the appendices.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 24 ABSTAIN: 1 NOT RETURNED: 1 Daniels

EXPLANATION OF ABSTAIN:
BALLANCO: As the proponent of this code change, I am abstaining to avoid any perceived conflict of interest.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 1106.4, Appendix C Item #: 244

SUBMITTER: Julius Ballanco, P.E. JB Engineering and Code Consulting, P.C. Rep. Self Comment #: 1

RECOMMENDATION:
Add new text

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

1106.0 Engineered Storm Drainage System.

1106.4 Alternative Engineered Roof Drainage Design. An engineered roof drainage system shall be permitted to be designed in accordance with the alternative engineered roof drainage design in Section C 701.1.

APPENDIX C
ALTERNATE PLUMBING SYSTEMS

C 701.0 Alternative Engineered Roof Drainage Design.
C 701.1 General. The roof drainage system shall be sized as a system in accordance with Section C 701.2 or Section C 701.3. The piping sizing shall be designed to accommodate the rainfall rates specified in Table D 101.1.
C 701.2 Roof Drainage Table Method. The rainwater drainage flow rate from the roof surface shall be determined based on the rainfall rate of a 60 minute storm with a 100 year return period and the area of the roof being drained in accordance with Table C 701.2.
C 701.2.1 Roof Drain. The discharge flow rate for the roof drain shall be the manufacturer’s published discharge flow rate based for a head height of 2 inches to 4 inches (51 mm to 102 mm) at the strainer. Roof drainage piping shall be sized in accordance with Tables C 701.4 through C 701.6.
C 701.2.2 Secondary Roof Drainage. The opening for the secondary roof drainage shall be not less than 2 inches (51 mm) and not more than 4 inches (102 mm) above the bottom opening of the primary roof drain. The secondary roof drainage system shall comply with Section 1101.12.2.

C 701.3 Engineered Roof Drain Flow Rate. The flow rate used for sizing the roof drainage piping shall be based on the maximum anticipated ponding at the roof drain based on a rainfall rate of a 60 minute storm with a 100 year return period and a 5 minute storm with a 10 year return period. The roof drain shall be sized for the anticipated flow rate. The roof drainage piping shall be sized in accordance with Section C 701.4 through Section C 701.6 for the anticipated flow rate.

C 701.3.1 Secondary Roof Drain. The discharge through the secondary roof drain shall not be considered where establishing the maximum height of ponding at the primary roof drain. The opening for the secondary roof drainage shall be not less than 2 inches (51 mm) above the bottom opening of the primary roof drain. The secondary roof drainage system shall comply with Section 1101.12.2.

![Table C 701.2: Roof Drainage Flow Rate](https://example.com/table-c-701-2)

<table>
<thead>
<tr>
<th>Roof Drainage Area (sq ft)</th>
<th>Drainage Flow Rate (gpm) Based on Rainfall Rates (in/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>500</td>
<td>5</td>
</tr>
<tr>
<td>1000</td>
<td>10</td>
</tr>
<tr>
<td>1500</td>
<td>16</td>
</tr>
<tr>
<td>2000</td>
<td>21</td>
</tr>
<tr>
<td>2500</td>
<td>26</td>
</tr>
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<td>3000</td>
<td>31</td>
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<td>3500</td>
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<td>42</td>
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<td>7000</td>
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<tr>
<td>10 000</td>
<td>104</td>
</tr>
<tr>
<td>11 000</td>
<td>114</td>
</tr>
<tr>
<td>12 000</td>
<td>125</td>
</tr>
</tbody>
</table>

For SI units: 1 square foot = 0.0929 m², 1 inch per hour = 25.4 mm/h, 1 gallon per minute = 0.06 L/s

C 701.4 Sizing Roof Drainage Piping. Vertical and horizontal roof drainage piping shall be sized to receive the discharge from the roof drain(s) and in accordance Table C 701.4.
### TABLE C 701.4
**ROOF DRAINAGE PIPE SIZING**

<table>
<thead>
<tr>
<th>Pipe Size (inch)</th>
<th>Vertical Drain</th>
<th>Maximum Permitted Flow Rate (gpm)</th>
<th>Horizontal Drain Based on Pitch (in/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1/16</td>
<td>1/8</td>
</tr>
<tr>
<td>2</td>
<td>34</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>87</td>
<td>39</td>
<td>55</td>
</tr>
<tr>
<td>4</td>
<td>180</td>
<td>81</td>
<td>115</td>
</tr>
<tr>
<td>5</td>
<td>311</td>
<td>117</td>
<td>165</td>
</tr>
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<td>6</td>
<td>538</td>
<td>243</td>
<td>344</td>
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<tr>
<td>8</td>
<td>1117</td>
<td>505</td>
<td>714</td>
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<td>10</td>
<td>2050</td>
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<td>1311</td>
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<td>3272</td>
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<td>2093</td>
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<tr>
<td>15</td>
<td>5543</td>
<td>2508</td>
<td>3546</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm, 1 inch per foot = 83.3 mm/m, 1 gallon per minute = 0.06 L/s

**C 701.5 Sizing Conductors and Leaders.** Conductors and leaders shall be in accordance with Table C 701.5.

### TABLE C 701.5
**CONDUCTOR AND LEADER SIZING**

<table>
<thead>
<tr>
<th>Size of Conductor or Leader (inch)</th>
<th>Maximum Permitted Flow Rate (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>2 × 2</td>
<td>30</td>
</tr>
<tr>
<td>1½ × 2½</td>
<td>30</td>
</tr>
<tr>
<td>2½</td>
<td>54</td>
</tr>
<tr>
<td>2½ × 2½</td>
<td>54</td>
</tr>
<tr>
<td>3</td>
<td>92</td>
</tr>
<tr>
<td>2 × 4</td>
<td>92</td>
</tr>
<tr>
<td>2½ × 3</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>192</td>
</tr>
<tr>
<td>3 × 4½</td>
<td>192</td>
</tr>
<tr>
<td>3½ × 4</td>
<td>192</td>
</tr>
<tr>
<td>5</td>
<td>360</td>
</tr>
<tr>
<td>4 × 5</td>
<td>360</td>
</tr>
<tr>
<td>4½ × 4½</td>
<td>360</td>
</tr>
<tr>
<td>6</td>
<td>563</td>
</tr>
<tr>
<td>5 × 6</td>
<td>563</td>
</tr>
<tr>
<td>5½ × 5½</td>
<td>563</td>
</tr>
<tr>
<td>8</td>
<td>1208</td>
</tr>
<tr>
<td>6 × 8</td>
<td>1208</td>
</tr>
</tbody>
</table>

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

**C 701.6 Sizing Gutters.** Gutters shall be sized based on the flow rate from the roof surface and in accordance with Table C 701.6.
### TABLE C 701.6
GUTTER SIZING

<table>
<thead>
<tr>
<th>Diameter of Gutter (inches)</th>
<th>Slope (in/ft)</th>
<th>Capacity (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1½ × 2½</td>
<td>1/4</td>
<td>26</td>
</tr>
<tr>
<td>1½ × 2½</td>
<td>1/2</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>1/8</td>
<td>39</td>
</tr>
<tr>
<td>2½ × 3</td>
<td>1/4</td>
<td>55</td>
</tr>
<tr>
<td>2½ × 3</td>
<td>1/2</td>
<td>87</td>
</tr>
<tr>
<td>5</td>
<td>1/8</td>
<td>74</td>
</tr>
<tr>
<td>4 × 2½</td>
<td>1/4</td>
<td>106</td>
</tr>
<tr>
<td>3 × 3½</td>
<td>1/2</td>
<td>156</td>
</tr>
<tr>
<td>6</td>
<td>1/8</td>
<td>110</td>
</tr>
<tr>
<td>3 × 5</td>
<td>1/4</td>
<td>157</td>
</tr>
<tr>
<td>3 × 5</td>
<td>1/2</td>
<td>225</td>
</tr>
<tr>
<td>8</td>
<td>1/16</td>
<td>172</td>
</tr>
<tr>
<td>8</td>
<td>1/8</td>
<td>247</td>
</tr>
<tr>
<td>4⅛ × 6</td>
<td>1/4</td>
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<td>1/4</td>
<td>651</td>
</tr>
<tr>
<td>4 × 10</td>
<td>1/2</td>
<td>1055</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm, 1 inch per foot = 83.3 mm/m, 1 gallon per minute = 0.06 L/s

**SUBSTANTIATION:**
The Technical Committee was correct in stating that the original text implied that the requirement was mandatory. The text in Section 1106.4 (Alternative Engineered Roof Drainage Design) has been revised to identify the alternative engineered roof drainage systems as an optional design method.

With this modification, the engineered design can be added to Appendix C with the appropriate reference.
CHAPTER 12
FUEL GAS PIPING

1208.2 Provision for Location of Point of Delivery. The location of the point of delivery shall be acceptable to the serving gas supplier. [NFPA 54:5.2]

1208.3 Interconnections Between Gas Piping Systems Supplying Separate Users. Where two or more meters, or two or more service regulators where meters are not provided, are located on the same premises and supply separate users, the gas piping systems shall not be interconnected on the outlet side of the meters or service regulators. [NFPA 54:5.3.4 - 5.2.1]

1208.3.1 Interconnections for Standby Fuels. Where a supplementary gas for standby use is connected downstream from a meter or a service regulator where a meter is not provided, equipment to prevent backflow shall be installed. A three-way valve installed to admit the standby supply and at the same time shut off the regular supply shall be permitted to be used for this purpose. [NFPA 54:5.3.2.1 - 5.3.2.2, 5.2.2.1 - 5.2.2.2]

1208.4 Sizing of Gas Piping Systems. Gas piping systems shall be of such size and so installed as to provide a supply of gas sufficient to meet the maximum demand and supply gas to each appliance inlet at not less than the minimum supply pressure required by the appliance. [NFPA 54:5.3.4, 5.3.1]

1208.4.1 Maximum Gas Demand. The volumetric flow rate of gas to be provided shall be the sum of the maximum input of the appliances served. The volumetric flow rate of gas to be provided shall be adjusted for altitude where the installation is above 2000 feet (610 m). [NFPA 54:5.4.2.1 - 5.4.2.2, 5.3.2.1 - 5.3.2.2] Where the input rating is not indicated, the gas supplier, appliance manufacturer, or a qualified agency shall be contacted, or the rating from Table 1208.4.1 shall be used for estimating the volumetric flow rate of gas to be supplied.

The total connected hourly load shall be used as the basis for piping sizing, assuming all appliances are operating at full capacity simultaneously.

Exception: Sizing shall be permitted to be based upon established load diversity factors. [NFPA 54:5.4.2.3 - 5.3.2.3]

1208.4.2 Sizing Methods. Gas piping shall be sized in accordance with one of the following:

1. Pipe sizing tables or sizing equations in this chapter.
2. Other approved engineering methods.
3. Sizing tables included in a listed piping system manufacturer’s installation instructions.
4. Engineering methods. [NFPA 54:5.4.1 - 5.3.3]

1208.4.3 Allowable Pressure Drop. The design pressure loss in any piping system under maximum probable flow conditions, from the point of delivery to the inlet connection of the appliance, shall be such that the supply pressure at the each appliance inlet is greater than or equal to the minimum pressure required by the appliance. [NFPA 54:5.4.4 - 5.3.4]

1208.5 Maximum Operating Pressure in Buildings. The maximum operating pressure for any piping systems located inside buildings shall not exceed 5 psi (34 kPa) unless one or more of the following conditions are met:

1. The piping joints are welded or brazed.
2. The piping is joined by fittings listed to ANSI LC 4/CSA 6.32 and installed according to the manufacturer’s installation instructions.
The piping joints are flanged and all pipe-to-flange connections are made by welding or brazing. The piping is located in a ventilated chase or otherwise enclosed for protection against accidental gas accumulation. The piping is located inside buildings or separate areas of buildings used exclusively for one of the following:
(a) Industrial processing or heating
(b) Research
(c) Warehousing
(d) Boiler or mechanical rooms
The piping is a temporary installation for buildings under construction.
The piping serves appliances or equipment used for agricultural purposes.
The piping is a temporary installation for buildings under construction.

# Section 1208.5

### 1208.5.1 LP-Gas Systems Operating Below -5°F (-21°C)
LP-Gas systems designed to operate below -5°F (-21°C) or with butane or a propane-butane mix shall be designed to either accommodate liquid LP-Gas or to prevent LP-Gas vapor from condensing back into a liquid. [NFPA 54:5.6.5.5-5.4.5]

### 1208.6 Acceptable Piping Materials and Joining Methods
Materials used for piping systems shall either comply with the requirements of this chapter or be acceptable to the Authority Having Jurisdiction. [NFPA 54:5.6.1.1-5.5.1.1]

### 1208.6.1 Used Materials
Pipe, fittings, valves, or other materials shall not be used again unless they are free of foreign materials and have been ascertained to be adequate for the service intended. [NFPA 54:5.6.1.2-5.5.1.2]

### 1208.6.2 Other Materials
Material not covered by the standards specifications listed herein shall meet the following criteria:

1. Be investigated and tested to determine that it is safe and suitable for the proposed service.
2. Be recommended for that service by the manufacturer.
3. Be acceptable to the Authority Having Jurisdiction. [NFPA 54:5.6.1.3]

### 1208.6.3 Metallic Pipe
Metallic pipe shall be in accordance with the Section 1208.6.3.1 through Section 1208.6.3.4.

#### 1208.6.3.1 Cast Iron
Cast-iron pipe shall not be used. [NFPA 54:5.6.2.1]

#### 1208.6.3.2 Steel, Stainless Steel, and Wrought-Iron Pipe
Steel tubing shall comply with ASTM A254. [NFPA 54:5.6.2.2]
Stainless steel tubing shall comply with one of the following:

- ASTM A269
-ASTM A268

#### 1208.6.3.3 Copper and Copper Alloy Pipe
Copper and copper alloy pipe shall not be used if the gas contains more than an average of 0.3 grains of hydrogen sulfide per 100 standard cubic feet (scf) of gas (0.7 mg/100 L).
Threaded copper, copper alloy, or aluminum alloy pipe shall not be used with gases corrosive to such material. [NFPA 54:5.6.2.3-5.6.2.4-5.6.2.3-5.5.2.4]

#### 1208.6.3.4 Aluminum Alloy Pipe
Aluminum alloy pipe shall comply with ASTM B241 (except that the use of alloy 5456 is prohibited), and shall be marked at each end of each length indicating compliance. Aluminum alloy pipe shall be coated to protect against external corrosion where it is in contact with masonry, plaster, or insulation or is subject to repeated wettings by such liquids as water, detergents, or sewage. [NFPA 54:5.6.2.5-5.5.2.5]
Aluminum alloy pipe shall not be used in exterior locations or underground. [NFPA 54:5.6.2.6-5.5.2.6]

### 1208.6.4 Metallic Tubing
Tubing shall not be used with gases corrosive to the tubing material. [NFPA 54:5.6.3.4-5.5.3.1]

#### 1208.6.4.1 Steel Tubing
Steel tubing shall comply with ASTM A254. [NFPA 54:5.6.3.2-5.5.3.2]

#### 1208.6.4.2 Stainless Steel
Stainless steel tubing shall comply with one of the following:

- ASTM A268
- ASTM A269 [NFPA 54:5.6.3.3-5.5.3.3]

#### 1208.6.4.3 Copper and Copper Alloy Tubing
Copper and copper alloy tubing shall not be used if the gas contains more than an average of 0.3 grains of hydrogen sulfide per 100 scf of gas (0.7 mg/100 L). Copper tubing shall comply with standard Type K or Type L of ASTM B88 or ASTM B280. [NFPA 54:5.6.3.4-5.5.3.4]

#### 1208.6.4.4 Aluminum Alloy Tubing
Aluminum alloy tubing shall comply with ASTM B210 or ASTM B241. Aluminum alloy tubing shall be coated to protect against external corrosion where it is in contact with masonry, plaster, or insulation or is subject to repeated wettings by such liquids as water, detergent, or sewer. Aluminum alloy tubing shall not be used in exterior locations or underground. [NFPA 54:5.6.3.5-5.5.3.5]

### 1208.6.5 Corrugated Stainless Steel Tubing
Corrugated stainless steel tubing shall be listed in accordance with CSA LC 1. [NFPA 54:5.6.3.6-5.5.3.6]

### 1208.6.6 Plastic Pipe, Tubing, and Fittings
Polyethylene plastic pipe, tubing, and fittings used to supply fuel gas shall conform to ASTM D2513. Pipe to be used shall be marked “gas” and “ASTM D2513.” Polyamide pipe, tubing, and fittings shall be identified in and conform to ASTM F2945. Pipe to be used shall be marked “gas” and “ASTM F2945.” Polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) plastic pipe, tubing, and fittings shall not be used to supply fuel gas. [NFPA 54:5.6.4.1.1-5.6.4.1.3-5.5.4.1.1-5.5.4.1.3]
1208.6.6 Regulator Vent Piping. Plastic pipe and fittings used to connect regulator vents to remote vent terminations shall be PVC conforming to UL 651 (Schedule 40 and 80). PVC vent piping shall not be installed indoors. [NFPA 54:5.6.4.2-5.5.4.2]

1208.6.7.1 Factory-Assembled Anodeless Risers. Factory-assembled anodeless risers shall be recommended by the manufacturer for the gas used and shall be leak tested by the manufacturer in accordance with written procedures. [NFPA 54:5.6.4.3(4)-5.5.4.3(1)]

1208.6.7.2 Service Head Adapters and Field-Assembled Anodeless Risers. Service head adapters and field-assembled anodeless risers incorporating service head adapters shall be recommended by the manufacturer for the gas used and shall be design-certified to meet the requirements of Category I of ASTM D2513 and 49 CFR 192.281(e). The manufacturer shall provide the user qualified installation instructions as prescribed by 49 CFR 192.283(b). [NFPA 54:5.6.4.3(2)-5.5.4.3(2)]

1208.6.7.3 Undiluted Liquified Petroleum Gas Piping. The use of plastic pipe, tubing, and fittings in undiluted LP-Gas piping systems shall be in accordance with NFPA 58. [NFPA 54:5.6.4.3(3)-5.5.4.3(3)]

1208.6.8 Workmanship and Defects. Gas pipe, tubing, and fittings shall be clear and free from cutting burrs and defects in structure or threading; and shall be thoroughly brushed and chip and scale blown. Defects in pipe, tubing, and fittings shall not be repaired. Defective pipe, tubing, and fittings shall be replaced. [NFPA 54:5.6.6-5.5.5]

1208.6.9 Metallic Pipe Threads. Metallic pipe and fitting threads shall be taper pipe threads and shall comply with ASME B1.20.1. [NFPA 54:5.6.6.1-5.5.6.1]

1208.6.9.1 Damaged Threads. Pipe with threads that are stripped, chipped, corroded, or otherwise damaged shall not be used. Where a weld opens during the operation of cutting or threading, that portion of the pipe shall not be used. [NFPA 54:5.6.6.2-5.5.6.2]

1208.6.9.2 Number of Threads. Field threading of metallic pipe shall be in accordance with Table 1208.6.9.2. [NFPA 54:5.6.6.3-5.5.6.3]

1208.6.9.3 Thread Joint Compounds Sealing. Threaded joints shall be made using a thread joint sealing material. [NFPA 54:5.5.6.4.1] Thread joint sealing materials shall be compatible with the pipe and fitting material on which the compounds are used. [NFPA 54:5.5.6.4.2] Thread joint compounds sealing materials shall be resistant to the action of LP-Gas or to any other chemical constituents of the gases to be conducted through the piping. [NFPA 54:5.5.6.4.3-5.5.6.4.3]

1208.6.10 Metallic Piping Joints and Fittings. The type of piping joint used shall be suitable for the pressure and temperature conditions and shall be selected giving consideration to joint tightness and mechanical strength under the service conditions. The joint shall be able to sustain the maximum end force due to the internal pressure and any additional forces due to temperature expansion or contraction, vibration, fatigue, or the weight of the pipe and its contents. [NFPA 54:5.6.7-5.5.7]

1208.6.10.1 Pipe Joints. Schedule 40 and heavier pipe joints shall be threaded, flanged, brazed, welded, or assembled with press-connect fittings listed to CSA LC 4. [NFPA 54:5.6.7-5.5.7]

(1) Where nonferrous pipe is brazed, the brazing materials shall have a melting point in excess of 1000°F (538°C).
(2) Brazing alloys shall not contain more than 0.05 percent phosphorus. [NFPA 54:5.6.7.1-5.5.7.1]

1208.6.10.2 Copper Tubing Joints. Copper tubing joints shall be assembled with approved gas tubing fittings, shall be brazed with a material having a melting point in excess of 1000°F (538°C), or shall be assembled with press-connect fittings listed to CSA LC 4. Press-Connect Metallic Fittings for Use in Fuel Gas Distribution Systems. Brazing alloys shall not contain more than 0.05 percent phosphorus. [NFPA 54:5.6.7.2-5.5.7.7]

1208.6.10.3 Stainless Steel Tubing Joints. Stainless steel joints shall be welded, assembled with approved tubing fittings, brazed with a material having a melting point in excess of 1000°F (538°C), or assembled with press-connect fittings listed to CSA LC 4. Press-Connect Metallic Fittings for Use in Fuel Gas Distribution Systems. Brazing alloys and fluxes shall be recommended by the manufacturer for use on stainless steel alloys. [NFPA 54:5.6.7.3-5.5.7.3]

1208.6.10.4 Flared Joints. Flared joints shall be used only in systems constructed from nonferrous pipe and tubing where experience or tests have demonstrated that the joint is suitable for the conditions and where provisions are made in the design to prevent separation of the joints. [NFPA 54:5.6.7.4-5.5.7.4]

1208.6.10.5 Metallic Pipe Fittings. Metallic fittings shall comply with the following:

(1) threaded fittings in sizes larger than 4 inches (100 mm) shall not be used.
(2) fittings used with steel, stainless steel, or wrought-iron pipe shall be steel, stainless steel, copper alloy, malleable iron, or cast iron.
(3) fittings used with copper or copper alloy pipe shall be copper or copper alloy.
(4) fittings used with aluminum alloy pipe shall be aluminum alloy.
(5) cast-iron fittings shall comply with the following:
(a) flanges shall be permitted.
(b) bushings shall not be used.
(c) fittings shall not be used in systems containing flammable gas-air mixtures.
(d) fittings in sizes 4 inches (100 mm) and larger shall not be used indoors unless approved by the Authority Having Jurisdiction.
(e) fittings in sizes 6 inches (150 mm) and larger shall not be used unless approved by the Authority Having Jurisdiction.
(6) Aluminum alloy fitting threads shall not form the joint seal.
(7) Zinc-aluminum alloy fittings shall not be used in systems containing flammable gas-air mixtures.
(8) Special fittings such as couplings, proprietary-type joints, saddle tees, gland-type compression fittings, and flared, flareless, or compression-type tubing fittings shall be as follows:
   (a) Used within the fitting manufacturer’s pressure-temperature recommendations.
   (b) Used within the service conditions anticipated with respect to vibration, fatigue, thermal expansion, or contraction.
   (c) Acceptable to the Authority Having Jurisdiction.
(9) When pipe fittings are drilled and tapped in the field, the operation shall be in accordance with the following:
   (a) The operation shall be performed on systems having operating pressures of 5 psi (34 kPa) or less.
   (b) The operation shall be performed by the gas supplier or their designated representative.
   (c) The drilling and tapping operation shall be performed in accordance with written procedures prepared by the gas supplier.
   (d) The fittings shall be located outdoors.
   (e) The tapped fitting assembly shall be inspected and proven to be free of leaks. [NFPA 54:5.6.7.5-5.5.7.5]

1208.6.11 Plastic Piping, Joints, and Fittings. Plastic pipe, tubing, and fittings shall be joined in accordance with the manufacturer’s instructions. Section 1208.6.11.1 through Section 1208.6.11.4 shall be observed when making such joints. [NFPA 54:5.6.8-5.5.8]

1208.6.11.1 Joint Design. The joint shall be designed and installed so that the longitudinal pullout resistance of the joint will be at least equal to the tensile strength of the plastic piping material. [NFPA 54:5.6.8(1)-5.5.8(1)]

1208.6.11.2 Heat Fusion Joint. Heat fusion joints shall be made in accordance with qualified procedures that have been established and proven by test to produce gastight joints at least as strong as the pipe or tubing being joined. Joints shall be made with the joining method recommended by the pipe manufacturer. Polyethylene heat fusion fittings shall be marked “ASTM D2513.” Polyamide heat fusion fittings shall be marked “ASTM F2945.” [NFPA 54:5.6.8(2)-5.5.8(2)]

1208.6.11.3 Compression-Type Mechanical Joints. Where compression-type mechanical joints are used, the gasket material in the fitting shall be compatible with the plastic piping and with the gas distributed by the system. An internal tubular rigid stiffener shall be used in conjunction with the fitting. The stiffener shall be flush with the end of the pipe or tubing and shall extend at least to the outside end of the compression fitting when installed. The stiffener shall be free of rough or sharp edges and shall not be a force fit in the plastic. Split tubular stiffeners shall not be used. [NFPA 54:5.6.8(3)-5.5.8(3)]

1208.6.11.4 Liquefied Petroleum Gas Piping Systems. Plastic piping joints and fittings for use in LP-Gas piping systems shall be in accordance with NFPA 58. [NFPA 54:5.6.8(4)-5.5.8(4)]

1208.6.12.1 Cast Iron Flanges. Cast iron flanges shall be in accordance with ASME B16.1. [NFPA 54:5.6.9.1.1-5.5.9.1.1]

1208.6.12.2 Steel Flanges. Steel flanges shall be in accordance with the following:
   (1) ASME B16.5 or
   (2) ASME B16.47. [NFPA 54:5.6.9.1.2-5.5.9.1.2]

1208.6.12.3 Non-Ferrous Flanges. Non-ferrous flanges shall be in accordance with ASME B16.24. [NFPA 54:5.6.9.1.3-5.5.9.1.3]

1208.6.12.4 Ductile Iron Flanges. Ductile iron flanges shall be in accordance with ASME B16.42. [NFPA 54:5.6.9.1.4-5.5.9.1.4]

1208.6.12.5 Dissimilar Flange Connections. Raised-face flanges shall not be joined to flat-faced cast iron, ductile iron or nonferrous material flanges. [NFPA 54:5.6.9.2-5.5.9.2]

1208.6.12.6 Flange Facings. Standard facings shall be permitted for use under this code. Where 150 psi (1034 kPa) steel flanges are bolted to Class 125 cast-iron flanges, the raised face on the steel flange shall be removed. [NFPA 54:5.6.9.4-5.5.9.4]

1208.6.12.7 Lapped Flanges. Lapped flanges shall be used only aboveground or in exposed locations accessible for inspection. [NFPA 54:5.6.9.4-5.5.9.4]

1208.6.13 Flange Gaskets. The material for gaskets shall be capable of withstanding the design temperature and pressure of the piping system and the chemical constituents of the gas being conducted without change to its chemical and physical properties. The effects of fire exposure to the joint shall be considered in choosing the material. [NFPA 54:5.6.9.10-5.5.10]

1208.6.13.1 Flange Gasket Materials. Acceptable materials shall include the following:
   (1) Metal (plain or corrugated)
   (2) Composition
   (3) Aluminum “O” rings
   (4) Spiral-wound metal gaskets
   (5) Rubber-faced phenolic
   (6) Elastomeric [NFPA 54:5.6.10.1-5.5.10.1]

1208.6.13.2 Metallic Flange Gaskets. Metallic flange gaskets shall be in accordance with ASME B16.20. [NFPA 54:5.6.10.2-5.5.10.2.1]
1208.6.13.3 Non-Metallic Flange Gaskets. Non-metallic flange gaskets shall be in accordance with ASME B16.21. [NFPA 54:5.6.10.2.2-5.5.10.2.2]

1208.6.13.4 Full-Face Flange Gasket. Full-face flange gaskets shall be used with all non-steel flanges. [NFPA 54:5.6.10.3-5.5.10.3]

1208.6.13.5 Separated Flanges. When a flanged joint is separated, the gasket shall be replaced. [NFPA 54:5.6.10.4-5.5.10.4]

1208.7 Gas Meters. Gas meters shall be selected for the maximum expected pressure and permissible pressure drop. [NFPA 54:5.7.4-5.6.1]

1208.7.1 Location. Gas meters shall be located in ventilated spaces readily accessible for examination, reading, replacement, or necessary maintenance. [NFPA 54:5.7.2.1-5.6.2.1]

1208.7.1.1 Subject to Protection from Damage. Gas meters shall not be placed where they will be subjected to damage, such as adjacent to a driveway, under a fire escape, in public passages, halls, or where they will be subject to excessive corrosion or vibration. [NFPA 54:5.7.2.2-5.6.2.2]

1208.7.1.2 Extreme Temperatures. Gas meters shall not be located where they will be subjected to extreme temperatures or sudden extreme changes in temperature or in areas where they are subjected to temperatures beyond those recommended by the manufacturer. [NFPA 54:5.7.2.3-5.6.2.3]

1208.7.2 Supports. Gas meters shall be supported or connected to rigid piping so as not to exert a strain on the meters. Where flexible connectors are used to connect a gas meter to downstream piping at mobile homes in mobile home parks, the meter shall be supported by a post or bracket placed in a firm footing or by other means providing equivalent support. [NFPA 54:5.7.3-5.6.3]

1208.7.3 Meter Protection. Meters shall be protected against overpressure, backpressure, and vacuum. [NFPA 54:5.7.4-5.6.4]

1208.7.4 Identification. Gas piping at multiple meter installations shall be marked by a metal tag or other permanent means designating the building or the part of the building being supplied and attached by the installing agency. [NFPA 54:5.7.5-5.6.5]

1208.8 Gas Pressure Regulators. A line pressure regulator shall be installed where the gas supply pressure exceeds the maximum allowable inlet pressure of the appliance served. [NFPA 54:5.8.1-5.7.1]

1208.8.1 Listing. Line pressure regulators shall be listed in accordance with CSA Z21.80 where the outlet pressure is set to 2 psi (14 kPa) or less. [NFPA 54:5.8.2-5.7.2]

1208.8.2 Location. The gas pressure regulator shall be accessible for servicing. [NFPA 54:5.8.3-5.7.3]

1208.8.3 Regulator Protection. Pressure regulators shall be protected against physical damage. [NFPA 54:5.8.4-5.7.4]

1208.8.4 Regulator Vents. Venting of line pressure regulators. Regulator vents shall be in accordance with Section 507.21. [NFPA 54:5.7.5]

Line pressure regulators shall comply with all of the following:

(1) An independent vent to the exterior of the building, sized in accordance with the regulator manufacturer’s instructions, shall be provided where the location of a regulator is such that a ruptured diaphragm will cause a hazard.

(a) Where more than one regulator is at a location, each regulator shall have a separate vent to the outdoors or, if approved by the Authority Having Jurisdiction, the vent lines shall be permitted to be manifolded in accordance with accepted engineering practices to minimize back pressure in the event of a diaphragm failure.

(b) Materials for vent piping shall be in accordance with Section 1208.6 through Section 1208.6.13.5.

Exception: A regulator and vent limiting means combination listed as complying with CSA Z21.80 shall be permitted to be used without a vent to the outdoors.

(2) The vent shall be designed to prevent the entry of water, insects, or other foreign materials that could cause blockage.

(3) The regulator vent shall terminate at least 3 feet (914 mm) from a source of ignition.

(4) At locations where regulators might be submerged during floods, a special antiflood type breather vent fitting shall be installed, or the vent line shall be extended above the height of the expected flood waters.

(5) A regulator shall not be vented to the appliance flue or exhaust system. [NFPA 54:5.8.5.1]

1208.8.5 Venting of Gas Appliance Pressure Regulators. For venting of gas appliance pressure regulators see Section 507.21. [NFPA 54:5.8.5.2]

1208.8.6 Bypass Piping. Valved and regulated bypasses shall be permitted to be placed around gas line pressure regulators where continuity of service is imperative. [NFPA 54:5.8.6]

1208.8.7 1208.8.8 Identification. Line pressure regulators at multiple regulator installations shall be marked by a metal tag or other permanent means designating the building or the part of the building being supplied. [NFPA 54:5.8.7-5.7.6]

1208.9 Overpressure Protection Required. Where the serving gas supplier delivers gas at a pressure greater than 2 psi (14 kPa) for piping systems serving appliances designed to operate at a gas pressure of 14 inches water column (3.5 kPa) or less, overpressure protection devices shall be installed. Piping systems serving equipment designed to operate at inlet pressures greater than 14 inches water column (3.5 kPa) shall be equipped with overpressure protection devices as required by the appliance manufacturer’s installation instructions. [NFPA 54:5.9.4-5.8.1]

1208.10 Overpressure Protection Devices. Overpressure protection devices shall be one of the following:

(1) Pressure relief valve.

(2) Monitor regulator.
(3) Series regulator installed upstream from the line regulator and set to continuously limit the pressure on the inlet of the line regulator to the maximum values specified by Section 1208.11 or less.

(4) Automatic shutoff device installed in series with the line pressure regulator and set to shut off when the pressure on the downstream piping system reaches the maximum values specified by Section 1208.11 or less. This device shall be designed so that it will remain closed until manually reset. [NFPA 54:5.9.3.1 – 5.8.3.1]

**1208.10.1 Separate Devices.** The devices in Section 1208.10 shall be installed either as an integral part of the service or line pressure regulator or as separate units. Where separate overpressure protection devices are installed, they shall comply with Section 1208.10.2 through Section 1208.10.7. [NFPA 54:5.9.3.2 – 5.8.3.2]

**1208.10.2 Construction and Installation.** All overpressure protection devices shall meet the following requirements:

1. Be constructed of materials so that the operation of the device is not impaired by corrosion of external parts by the atmosphere or of internal parts by the gas.

2. Be designed and installed so they can be operated to determine whether the valve is free. The devices shall also be designed and installed so they can be tested to determine the pressure at which they operate and be examined for leakage when in the closed position. [NFPA 54:5.9.4 – 5.8.4]

**1208.10.3 External Control Piping.** External control piping shall be designed and installed so that damage to the control piping of one device does not render both the regulator and the overpressure protective device inoperative. [NFPA 54:5.9.5 – 5.8.5]

**1208.10.4 Setting.** Each pressure limiting or pressure relieving device shall be set so that the gas pressure supplied to the connected appliance(s) does not exceed the limits specified in Section 1208.11 and Section 1208.11.1. [NFPA 54:5.9.6 – 5.8.6]

**1208.10.5 Unauthorized Operation.** Where unauthorized operation of any shutoff valve could render a pressure relieving valve or pressure limiting device inoperative, one of the following shall be accomplished:

1. The valve shall be locked in the open position. Instruct authorized personnel in the importance of leaving the shutoff valve open and of being present while the shutoff valve is closed so that it can be locked in the open position before leaving the premises.

2. Duplicate relief valves shall be installed, each having adequate capacity to protect the system, and arrange the isolating valves or three-way valve so that only one relief valve can be rendered inoperative at a time. [NFPA 54:5.9.7 – 5.8.7]

**1208.10.6 Discharge of Vents.** The discharge stacks, vents, or outlet parts of all pressure relieving and pressure limiting devices shall be located so that gas is safely discharged to the outdoors. Discharge stacks or vents shall be designed to prevent the entry of water, insects, or other foreign material that could cause blockage. The discharge stack or vent line shall be at least the same size as the outlet of the pressure relieving device. [NFPA 54:5.9.8.1 – 5.9.8.2 – 5.8.8.1 – 5.8.8.2]

**1208.10.7 Size of Fittings, Pipe, and Openings.** The fittings, pipe, and openings located between the system to be protected and the pressure relieving device shall be sized to prevent hammering of the valve and to prevent impairment of relief capacity. [NFPA 54:5.9.9.5.8.9]

**1208.11 Pressure Limitation Requirements.** Where piping systems serving appliances designed to operate with a gas supply pressure of 14 inches water column (3.5 kPa) or less are required to be equipped with overpressure protection by Section 1208.9, each overpressure protection device shall be adjusted to limit the gas pressure to each connected appliance to 2 psi (14 kPa) or less upon a failure of the line pressure regulator. [NFPA 54:5.9.2.1 – 5.8.2.1]

**1208.11.1 Overpressure Protection Required.** Where piping systems serving appliances designed to operate with a gas supply pressure greater than 14 inches water column (3.5 kPa) are required to be equipped with overpressure protection by Section 1208.9, each overpressure protection device shall be adjusted to limit the gas pressure to each connected appliance as required by the appliance manufacturer’s installation instructions. [NFPA 54:5.9.2.2 – 5.8.2.2]

**1208.11.2 Overpressure Protection Devices.** Each overpressure protection device installed to meet the requirements of this section shall be capable of limiting the pressure to its connected appliance(s) as required by this section independently of any other pressure control equipment in the piping system. [NFPA 54:5.9.2.3 – 5.8.2.3]

**1208.11.3 Detection of Failure.** Each gas piping system for which an overpressure protection device is required by this section shall be designed and installed so that a failure of the line pressure control device(s) is detectable. [NFPA 54:5.9.2.4 – 5.8.2.4]

**1208.11.4 Flow Capacity.** If a pressure relief valve is used to meet the requirements of this section, it shall have a flow capacity such that the pressure in the protected system is maintained at or below the limits specified in Section 1208.11 under the following conditions:

1. The line pressure regulator for which the relief valve is providing overpressure protection has failed wide open.

2. The gas pressure at the inlet of the line pressure regulator for which the relief valve is providing overpressure protection is not less than the regulator’s normal operating inlet pressure. [NFPA 54:5.9.2.5 – 5.8.2.5]

**1208.12 Backpressure Protection.** Protective devices shall be installed as close to the equipment as practical where the design of equipment connected is such that air, oxygen, or standby gases could be forced into the gas supply system.

Gas and air combustion mixers incorporating double diaphragm “zero” or “atmosphere” governors or regulators shall require no further protection unless connected directly to compressed air or oxygen at pressures of 5 psi (34 kPa) or more. [NFPA 54:5.10.1.1 – 5.10.1.2 – 5.9.1.1 – 5.9.1.2]
1208.12.1 Protective Devices. Protective devices shall include but not be limited to the following:

1. Check valves.
2. Three-way valves (of the type that completely closes one side before starting to open the other side).
3. Reverse flow indicators controlling positive shutoff valves.
4. Normally closed air-actuated positive shutoff pressure regulators. [NFPA 54:5.10.2–5.9.2]

1208.13 Low-Pressure Protection. A protective device shall be installed between the meter and the appliance or equipment if the operation of the appliance or equipment is such that it could produce a vacuum or a dangerous reduction in gas pressure at the meter. Such protective devices include, but are not limited to, mechanical, diaphragm-operated, or electrically operated low-pressure shutoff valves. [NFPA 54:5.11–5.10]

1208.14 Shutoff Valves. Shutoff valves shall be approved and shall be selected giving consideration to pressure drop, service involved, emergency use, and reliability of operation in accordance with Table 1208.14. Shutoff valves of size 1 inch (25 mm) National Pipe Thread and smaller shall be listed and labeled. Where used outdoors, such use shall be in accordance with the manufacturer's recommendation. [NFPA 54:5.12–5.11]

1208.15 Expansion and Flexibility. Piping systems shall be designed to prevent failure from thermal expansion or contraction. [NFPA 54:5.14–5.13.1]

1208.15.1 Special Local Conditions. Where local conditions include earthquake, tornado, unstable ground, or flood hazards, special consideration shall be given to increased strength and flexibility of piping supports and connections. [NFPA 54:5.14–5.13.2]

1208.16 Pressure Regulator and Pressure Control Venting. The venting of the atmospheric side of diaphragms in line pressure regulators, gas appliance regulators, and gas pressure limit controls shall be in accordance with all of the following:

1. An independent vent pipe to the outdoors, sized in accordance with the device manufacturer's instructions, shall be provided where the location of a device is such that a discharge of fuel gas will cause a hazard. For devices other than appliance regulators, vents are not required to be independent where the vents are connected to a common manifold designed in accordance with engineering methods to minimize backpressure in the event of diaphragm failure and such design is approved.

Exceptions:

1. A regulator and vent limiting means combination listed as complying with ANSI Z21.80/CSA 6.22 shall not be required to be vented to the outdoors.
2. A listed gas appliance regulator factory equipped with a vent limiting device is not required to be vented to the outdoors.
3. Materials for vent piping shall be in accordance with Section 1208.6 through Section 1208.6.13.5.
4. The vent terminus shall be designed to prevent the entry of water, insects, and other foreign matter that could cause blockage.
5. Vent piping shall be installed to minimize static loads and bending moments placed on the regulators and gas pressure control devices.
6. Vents shall terminate not less than 3 feet (914 mm) from a possible source of ignition.
7. At locations where a vent termination could be submerged during floods or snow accumulations, an antiflood-type breather vent fitting shall be installed, or the vent terminal shall be located above the height of the expected flood waters or snow.
8. Vent piping from pressure regulators and gas pressure controls shall not be connected to a common manifold that serves a bleed line from a diaphragm-type gas valve. [NFPA 54:5.14]

1209.1 General. Where automatic excess flow valves are installed, they shall be listed in accordance with ANSI Z21.93/CSA 6.30 and shall be sized and installed in accordance with the manufacturer's instructions. [NFPA 54:5.145.12]

1210.1 Piping Underground. Underground gas piping shall be installed with sufficient clearance from any other underground structure to avoid contact therewith, to allow maintenance, and to protect against damage from proximity to other structures. In addition, underground plastic piping shall be installed with sufficient clearance or shall be insulated from any source of heat so as to prevent the heat from impairing the serviceability of the pipe. [NFPA 54:7.1.1–7.1.1.2]

1210.1.1 Cover Requirements. Underground piping systems shall be installed with a minimum of 12 inches (305 mm) of cover. The minimum cover shall be increased to 18 inches (457 mm) if external damage to the pipe or tubing from external forces is likely to result. Where a minimum of 12 inches (305 mm) of cover cannot be provided, the pipe-piping shall be installed in conduit or bridged (shielded). [NFPA 54:7.1.2.1 – 7.1.2.1(B)]

1210.1.5 Piping through Foundation Wall. Piping through a foundation wall shall comply with all of the following:

1. Underground piping, where installed through the outer foundation or basement wall of a building, shall be encased in a protective sleeve or protected by an approved device or method.
2. The space between the gas piping and the sleeve and between the sleeve and the wall shall be sealed to prevent entry of gas and water.
3. Sealing materials shall be compatible with the piping and sleeve. [NFPA 54:7.1.5]
1210.1.7 **Connections of Plastic Piping.** Plastic piping shall be installed outdoors, underground only.

**Exceptions:**
(1) Plastic piping shall be permitted to terminate aboveground where an anodeless riser is used.
(2) Plastic piping shall be permitted to terminate with a wall head adapter aboveground in buildings, including basements, where the plastic piping is inserted in a piping material permitted for use in buildings. [NFPA 54:7.1.7.1]

1210.3 **Installation of Aboveground Piping.** Piping installed aboveground shall comply with all of the following:
(1) Piping shall be securely supported and located where it will be protected from physical damage.
(2) Where passing through an exterior wall, the piping shall also be protected from corrosion by coating or wrapping with an inert material approved for such applications.
(3) The piping shall be sealed around its circumference at the point of the exterior penetration to prevent the entry of water, insects, and rodents.
(4) Where piping is encased in a protective pipe sleeve, the annular spaces between the gas piping and the sleeve and between the sleeve and the wall opening shall be sealed.
(5) Piping installed outdoors shall be elevated not less than 3½ inches (89 mm) above the ground.
(6) Sealing materials shall be compatible with the piping and sleeve. [NFPA 54:7.2.2.1]

1210.3.5.3 **Piping on Roofs.** Gas piping installed on the roof surfaces shall be elevated above the roof surface and shall be supported in accordance with Table 1210.3.5.1. Gas piping shall be elevated not less than 3½ inches (89 mm) above the roof surface. [NFPA 54:7.2.6.4.1, 7.2.6.4.2]

1210.4.4 **Piping in Floors—Industrial Occupancies.** In industrial occupancies, gas piping in solid floors such as concrete shall be laid in channels in the floor and covered to permit access to the piping with a minimum of damage to the building. Where piping in floor channels could be exposed to excessive moisture or corrosive substances, the piping shall be protected in an approved manner. [NFPA 54:7.3.5.1]

1210.4.5 **Other Occupancies.** In other than industrial occupancies and where approved by the Authority Having Jurisdiction, gas piping embedded in concrete floor slabs constructed with portland cement shall be surrounded with a minimum of 1½ inches (38 mm) of concrete and shall not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. All piping, fittings, and risers shall be protected against corrosion in accordance with Section 1210.3.1. Piping shall not be embedded in concrete slabs containing quick-set quickset additives or cinder aggregate. [NFPA 54:7.3.5.1—7.3.5.2]

1210.9 **Manual Gas Shutoff Valves.** An accessible gas shutoff valve shall be provided upstream of each gas pressure regulator. Where two gas pressure regulators are installed in series on a single gas line, a manual valve shall not be required at the second regulator. [NFPA 54:7.8.4.1, 7.8.4.2]

1210.9.1 **Accessibility of Gas Valves Controlling Multiple Systems.** Main gas systems shutoff valves controlling several gas piping systems shall be readily accessible for operation and installed so as to be protected from physical damage. They System shut off valves shall be marked with a metal tag or other permanent means attached by the installing agency so that the gas piping systems supplied through them can be readily identified. [NFPA 54:7.8.2.1—7.8.2.4, 7.8.1.1—7.8.1.2]

1210.9.2 **Shutoff Valves for Multiple House Lines.** In multiple-tenant buildings supplied through a master meter, through one service regulator where a meter is not provided, or where meters or service regulators are not readily accessible from the appliance or equipment location, an individual shut off valve for each apartment or tenant line shall be provided at a convenient point of general accessibility. In a common system serving a number of individual buildings, shut off valves shall be installed at each building. [NFPA 54:7.8.2.1, 7.8.2.2, 7.8.3.1]

1210.9.3 **Emergency Shut off Valves.** An exterior shut off valve to permit turning off the gas supply to each building in an emergency shall be provided. The emergency shut off valves shall be plainly marked as such and their locations posted as required by the Authority Having Jurisdiction. [NFPA 54:7.8.2.3, 7.8.2.4]

1210.9.4 **Shut off Valve for Laboratories.** Each laboratory space containing two or more gas outlets installed on tables, benches, or in hoods in educational, research, commercial and industrial occupancies shall have a single shut off valve through which all such gas outlets are supplied. The shut off valve shall be accessible, located within the laboratory or adjacent to the laboratory's egress door, and identified. [NFPA 54:7.8.2.4—7.8.3.3]

1210.9.5 **System Shut off Valve.** Where a system shut off valve is installed, the valve shall comply with Section 1208.14. [NFPA 54:7.8.4]

1210.12.5 **Installation of Gas-Mixing Machines.** Installation of gas-mixing machines shall comply with the following:
Section 1210.12.5.1 through Section 1210.12.5.5.

1210.12.5.1 **Location.** The gas-mixing machine shall be located in a well-ventilated area or in a detached building or cut-off room provided with room construction and explosion vents in accordance with sound engineering principles methods. Such rooms or below-grade installations shall have adequate positive ventilation. [NFPA 54:7.11.5.1]

1210.12.5.2 **Electrical Requirements.** Where gas-mixing machines are installed in well-ventilated areas, the type of electrical equipment shall be in accordance with NFPA 70 for general service conditions unless other hazards in the
area prevail. Where gas-mixing machines are installed in small detached buildings or cutoff rooms, the electrical equipment and wiring shall be installed in accordance with NFPA 70 for hazardous locations (Articles 500 and 501, Class I, Division 2). [NFPA 54:7.11.5.2]

(2) 1210.12.5.3 Air Intakes. Air intakes for gas-mixing machines using compressors or blowers shall be taken from outdoors whenever practical. [NFPA 54:7.11.5.3]

(4) 1210.12.5.4 Controls. Controls for gas-mixing machines shall include interlocks and a safety shutoff valve of the manual reset type in the gas supply connection to each machine arranged to automatically shut off the gas supply in the event of high or low gas pressure. Except for open burner installations only, the controls shall be interlocked so that the blower or compressor stops operating following a gas supply failure. Where a system employs pressurized air, means shall be provided to shut off the gas supply in the event of air failure. [NFPA 54:7.11.5.4]

(5) 1210.12.5.5 Installation in Parallel. Centrifugal gas-mixing machines in parallel shall be reviewed by the user and equipment manufacturer before installation, and means or plans for minimizing the effects of downstream pulsation and equipment overload shall be prepared and utilized as needed. [NFPA 54:7.11.5.5]

1210.12.6 Use of Automatic Firechecks, Safety Blowouts, or Backfire Preventers. Automatic firechecks and safety blowouts or backfire preventers shall be provided in piping systems distributing flammable gas-air mixtures from gas-mixing machines to protect the piping and the machines in the event of flashback, in accordance with the following:

(1) Approved automatic firechecks shall be installed upstream as close as practical to the burner inlets following the firecheck manufacturer’s instructions.
(2) A separate manually operated gas valve shall be provided at each automatic firecheck for shutting off the flow of the gas-air mixture through the firecheck after a flashback has occurred. The valve shall be located upstream as close as practical to the inlet of the automatic firecheck.

Caution: These valves shall not be reopened after a flashback has occurred until the firecheck has cooled sufficiently to prevent re-ignition of the flammable mixture and has been reset properly.

(3) A safety blowout or backfiring preventer shall be provided in the mixture line near the outlet of each gas-mixing machine where the size of the piping is larger than 2½ inches (65 mm) NPS, or equivalent, to protect the mixing equipment in the event of an explosion passing through an automatic firecheck. The manufacturer’s instructions shall be followed when installing these devices, particularly after a disc has burst. The discharge from the safety blowout or backfire preventer shall be located or shielded so that particles from the ruptured disc cannot be directed toward personnel. Wherever there are interconnected installations of gas-mixing machines with safety blowouts or backfire preventers, provision shall be made to keep the mixture from other machines from reaching any ruptured disc opening.

Check valves shall not be used for this purpose.

(4) Large-capacity premix systems provided with explosion heads (rupture discs) to relieve excessive pressure in pipelines shall be located at and vented to a safe outdoor location. Provisions shall be provided for automatically shutting off the supply of the gas-air mixture in the event of rupture. [NFPA 54:7.11.6]

1211.4 Prohibited Use. Gas piping shall not be used as a grounding conductor or electrode. [NFPA 54:7.12.4-7.12.4.1]

1212.1 Connecting Appliances and Equipment. Appliances and equipment shall be connected to the building piping in compliance with Section 1212.6 through Section 1212.8 by one of the following:

(1) Rigid metallic pipe and fittings.
(2) Semirigid metallic tubing and metallic fittings. Aluminum alloy tubing shall not be used in exterior locations.
(3) A listed connector for gas appliances listed in compliance-accordance with GSA-ANSI Z21.24/CSA 6.27. The connector shall be used in accordance with the manufacturer’s installation instructions and shall be in the same room as the appliance. Only one connector shall be used per appliance.
(4) A listed connector for outdoor gas appliances and manufactured homes listed in compliance-accordance with GSA ANSI Z21.75/CSA 6.27. Only one connector shall be used per appliance.
(5) CSST where installed in accordance with the manufacturer’s installation instructions. CSST shall not be directly routed into a metallic appliance enclosure where the appliance is connected to a metallic vent that terminates above a roofline. CSST shall connect only to appliances that are fixed in place.
(6) Listed nonmetallic gas hose connectors in accordance with Section 1212.3.
(7) Unlisted gas hose connectors for use in laboratories and educational facilities in accordance with Section 1212.4. [NFPA 54:9.6.1]

1212.1.1 Commercial Cooking Appliances - Food Service Appliance Connectors. Connectors used with commercial cooking-food service appliances that are moved for cleaning and sanitation purposes shall be installed in accordance with the connector manufacturer’s installation instructions. Such connectors shall be listed in accordance with GSA ANSI Z21.69/CSA 6.16. [NFPA 54:9.6.1.3]

1212.7 Quick-Disconnect Devices. Quick-disconnect devices used to connect appliances to the building piping shall be listed in accordance with GSA-ANSI Z21.41/CSA 6.9. Where installed indoors, an approved manual shutoff valve with a non-displaceable nondisplaceable valve member shall be installed upstream of the quick-disconnect device. [NFPA 54:9.6.6.1 – 9.6.6.2]
### TABLE 1208.4.1
APPROXIMATE GAS INPUT FOR TYPICAL APPLIANCES

[NFPA 54: TABLE A.5.4.2.1-A.5.3.2.1]

<table>
<thead>
<tr>
<th>APPLIANCE</th>
<th>INPUT (Btu/h approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Space Heating Units</strong></td>
<td></td>
</tr>
<tr>
<td>Warm air furnace</td>
<td></td>
</tr>
<tr>
<td>Single family</td>
<td>100 000</td>
</tr>
<tr>
<td>Multifamily, per unit</td>
<td>60 000</td>
</tr>
<tr>
<td>Hydronic boiler</td>
<td></td>
</tr>
<tr>
<td>Single family</td>
<td>100 000</td>
</tr>
<tr>
<td>Multifamily, per unit</td>
<td>60 000</td>
</tr>
<tr>
<td><strong>Space and Water Heating Units</strong></td>
<td></td>
</tr>
<tr>
<td>Hydronic boiler</td>
<td></td>
</tr>
<tr>
<td>Single-family</td>
<td>120 000</td>
</tr>
<tr>
<td>Multifamily, per unit</td>
<td>75 000</td>
</tr>
<tr>
<td><strong>Water Heating Appliances</strong></td>
<td></td>
</tr>
<tr>
<td>Water heater, automatic storage</td>
<td></td>
</tr>
<tr>
<td>30 to 40 gallon tank</td>
<td>35 000</td>
</tr>
<tr>
<td>Water heater, automatic storage</td>
<td></td>
</tr>
<tr>
<td>50 gallon tank</td>
<td>50 000</td>
</tr>
<tr>
<td>Water heater, automatic instantaneous</td>
<td></td>
</tr>
<tr>
<td>Capacity at 2 gallons per minute</td>
<td>142 800</td>
</tr>
<tr>
<td>Capacity at 4 gallons per minute</td>
<td>285 000</td>
</tr>
<tr>
<td>Capacity at 6 gallons per minute</td>
<td>428 400</td>
</tr>
<tr>
<td>Water heater, domestic, circulating or side-arm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35 000</td>
</tr>
<tr>
<td><strong>Cooking Appliances</strong></td>
<td></td>
</tr>
<tr>
<td>Range, freestanding, domestic</td>
<td>65 000</td>
</tr>
<tr>
<td>Built-in oven or broiler unit, domestic</td>
<td>25 000</td>
</tr>
<tr>
<td>Built-in top unit, domestic</td>
<td>40 000</td>
</tr>
<tr>
<td><strong>Other Appliances</strong></td>
<td></td>
</tr>
<tr>
<td>Refrigerator</td>
<td>3000</td>
</tr>
<tr>
<td>Clothes dryer, Type 1 (domestic)</td>
<td>35 000</td>
</tr>
<tr>
<td>Gas fireplace direct-vent</td>
<td>40 000</td>
</tr>
<tr>
<td>Gas log</td>
<td>80 000</td>
</tr>
<tr>
<td>Barbecue</td>
<td>40 000</td>
</tr>
<tr>
<td>Gas light</td>
<td>2500</td>
</tr>
</tbody>
</table>

For SI units: 1000 British thermal units per hour = 0.293 kW
### TABLE 1208.6.9.2
**SPECIFICATIONS FOR THREADING METALLIC PIPE**

<table>
<thead>
<tr>
<th>IRON PIPE SIZE (inches)</th>
<th>APPROXIMATE LENGTH OF THREADED PORTION (inches)</th>
<th>APPROXIMATE NUMBER OF THREADS TO BE CUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>½</td>
<td>¾</td>
<td>10</td>
</tr>
<tr>
<td>¾</td>
<td>¾</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>7/8</td>
<td>10</td>
</tr>
<tr>
<td>1¼</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>1½</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>2½</td>
<td>1½</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>1½</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>1 5/8</td>
<td>13</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25.4 mm

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### TABLE 1208.14
**MANUAL GAS VALVE STANDARDS**

<table>
<thead>
<tr>
<th>SHUTOFF VALVE APPLICATION</th>
<th>STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appliance shutoff valve up to ½ psi</td>
<td>ANSI Z21.15/CSA 9.1</td>
</tr>
<tr>
<td></td>
<td>ANSI/ASME B16.44</td>
</tr>
<tr>
<td></td>
<td>ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32</td>
</tr>
<tr>
<td>Valve up to ½ psi</td>
<td>ANSI/ASME B16.44</td>
</tr>
<tr>
<td></td>
<td>ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32</td>
</tr>
<tr>
<td>Valve up to 2 psi</td>
<td>ANSI/ASME B16.44 labeled 2G</td>
</tr>
<tr>
<td></td>
<td>ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32 with ANSI/ASME B 16.44 labeled 2G or labeled 5G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32 with ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td>Valve up to 5 psi</td>
<td>ANSI/ASME B16.44 labeled 5G</td>
</tr>
<tr>
<td></td>
<td>ANSI/ASME B16.33</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32 with ANSI/ASME B16.44 marked 5G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32 with ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td>Valve up to 125 psi</td>
<td>ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32 with ANSI/ASME B16.33 marked 125 G</td>
</tr>
</tbody>
</table>

For SI Units: 1 pound-force per square inch = 6.8947 kPa
### TABLE 1210.3.5.1
**SUPPORT OF PIPING**

[NFPA 54: TABLE 7.2.6.2]

<table>
<thead>
<tr>
<th>STEEL PIPE, NOMINAL SIZE OF PIPE (inches)</th>
<th>SPACING OF SUPPORTS (feet)</th>
<th>NOMINAL SIZE OF TUBING SMOOTH WALL (inches O.D.)</th>
<th>SPACING OF SUPPORTS (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>½</td>
<td>6</td>
<td>½</td>
<td>4</td>
</tr>
<tr>
<td>¾ or 1</td>
<td>8</td>
<td>⅜ or ¾</td>
<td>6</td>
</tr>
<tr>
<td>1¼ or larger (horizontal)</td>
<td>10</td>
<td>⅞ or 1 (horizontal)</td>
<td>8</td>
</tr>
<tr>
<td>1¼ or larger (vertical)</td>
<td>Every floor level</td>
<td>1 or larger (vertical)</td>
<td>Every floor level</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm

### TABLE 1215.2(27)
**SCHEDULE 40 METALLIC PIPE**

[NFPA 54: TABLE 6.3.1(d)]*

<table>
<thead>
<tr>
<th>GAS: UNDILUTED PROPANE</th>
<th>INLET PRESSURE: 11.0 in. w.c.</th>
<th>PRESSURE DROP: 0.5 in. w.c.</th>
<th>SPECIFIC GRAVITY: 1.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTENDED USE: PIPE SIZING BETWEEN SINGLE- OR SECOND-STAGE (LOW-PRESSURE) REGULATOR AND APPLIANCE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PIPE SIZE (inch)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOMINAL INSIDE: ½</td>
<td>½</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual: 0.622</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>¾</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1¼</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1½</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2½</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LENGTH (feet)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>291</td>
<td>608</td>
<td>1150</td>
</tr>
<tr>
<td>20</td>
<td>200</td>
<td>418</td>
<td>787</td>
</tr>
<tr>
<td>30</td>
<td>160</td>
<td>336</td>
<td>632</td>
</tr>
<tr>
<td>40</td>
<td>137</td>
<td>287</td>
<td>541</td>
</tr>
<tr>
<td>50</td>
<td>122</td>
<td>255</td>
<td>480</td>
</tr>
<tr>
<td>60</td>
<td>110</td>
<td>231</td>
<td>434</td>
</tr>
<tr>
<td>80-70</td>
<td>101</td>
<td>212</td>
<td>400</td>
</tr>
<tr>
<td>400-80</td>
<td>94</td>
<td>197</td>
<td>372</td>
</tr>
<tr>
<td>425-90</td>
<td>89</td>
<td>185</td>
<td>349</td>
</tr>
<tr>
<td>450-100</td>
<td>84</td>
<td>175</td>
<td>330</td>
</tr>
<tr>
<td>475-125</td>
<td>74</td>
<td>155</td>
<td>292</td>
</tr>
<tr>
<td>500-150</td>
<td>67</td>
<td>140</td>
<td>265</td>
</tr>
<tr>
<td>250-175</td>
<td>62</td>
<td>129</td>
<td>243</td>
</tr>
<tr>
<td>300-200</td>
<td>58</td>
<td>120</td>
<td>227</td>
</tr>
<tr>
<td>350-250</td>
<td>51</td>
<td>107</td>
<td>201</td>
</tr>
<tr>
<td>400-300</td>
<td>46</td>
<td>97</td>
<td>182</td>
</tr>
<tr>
<td>450-350</td>
<td>42</td>
<td>89</td>
<td>167</td>
</tr>
<tr>
<td>500-400</td>
<td>40</td>
<td>83</td>
<td>156</td>
</tr>
<tr>
<td>550-450</td>
<td>37</td>
<td>78</td>
<td>146</td>
</tr>
<tr>
<td>600-500</td>
<td>35</td>
<td>73</td>
<td>138</td>
</tr>
<tr>
<td>650-550</td>
<td>33</td>
<td>70</td>
<td>131</td>
</tr>
<tr>
<td>700-600</td>
<td>32</td>
<td>66</td>
<td>125</td>
</tr>
</tbody>
</table>
For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm, 1000 British thermal units per hour = 0.293 kW, 1 inch water column = 0.249 kPa

* Table entries are rounded to 3 significant digits.

**TABLE 1701.1**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASME B16.33-2012 (R2017)</td>
<td>Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 175 psi (Sizes NPS 1/2 through NPS 2)</td>
<td>Valves</td>
<td>Table 1208.14</td>
</tr>
<tr>
<td>ASME B16.44-2012 (R2017)</td>
<td>Manually Operated Metallic Gas Valves for Use in Above Ground Piping Systems up to 5 psi</td>
<td>Valves</td>
<td>Table 1208.14</td>
</tr>
<tr>
<td>ANSI Z21.15b-2013 (R2019)/CSA 9.1b-2013 (R2019)</td>
<td>Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves (same as CSA 9.1b)</td>
<td>Valves</td>
<td>Table 1208.14</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**TABLE 1701.2**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASME B16.33-2012 (R2017)</td>
<td>Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 175 psi (Sizes NPS 1/2 through NPS 2)</td>
<td>Valves</td>
</tr>
<tr>
<td>CSA Z21.15b-2013 (R2014)</td>
<td>Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves (same as CSA 9.1b)</td>
<td>Fuel Gas</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The above sections have been revised to correlate with NFPA 54-2021 (latest version) in accordance with IAPMO’s Regulations Governing Committee Projects (Extract Guidelines).

**COMMITTEE ACTION:** ACCEPT AS AMENDED BY THE TC

Amend proposal as follows:
1208.3 Interconnections Separate Users. Where two or more meters, or two or more service regulators where meters are not provided, are located on the same premises and supply separate users, the gas piping systems shall not be interconnected on the outlet side of the meters or service regulators. [NFPA 5.5.1.1]

1208.3.1 Interconnections for Standby Fuels. Where a supplementary gas for standby use is connected downstream from a meter or a service regulator where a meter is not provided, equipment to prevent backflow shall be installed. A three-way valve installed to admit the standby supply and at the same time shut off the regular supply shall be permitted to be used for this purpose. [NFPA 5.5.2.2.1 – 5.5.2.2.2]

1208.4 Sizing of Gas Piping Systems. Gas piping systems shall be of such size and so installed as to provide a supply of gas sufficient to meet the maximum demand and supply gas to each appliance inlet at not less than the minimum supply pressure required by the appliance. [NFPA 5.5.3.1]

1208.4.1 Maximum Gas Demand. The volumetric flow rate of gas to be provided shall be the sum of the maximum input of the appliances served. The volumetric flow rate of gas to be provided shall be adjusted for altitude where the installation is above 2000 feet (610 m). [NFPA 5.3.2.1 – 5.3.2.2] Where the input rating is not indicated, the gas supplier, appliance manufacturer, or a qualified agency shall be contacted, or the rating from Table 1208.4.1 shall be used for estimating the volumetric flow rate of gas to be supplied. The total connected hourly load shall be used as the basis for piping sizing, assuming all appliances are operating at full capacity simultaneously.

Exception: Sizing shall be permitted to be based upon established load diversity factors. [NFPA 5.3.2.3]

1208.4.2 Sizing Methods. Gas piping shall be sized in accordance with one of the following:

1. Pipe sizing tables or sizing equations in this chapter.
2. Sizing tables included in a listed piping system manufacturer’s installation instructions.
3. Engineering methods. [NFPA 5.5.3.3]

1208.4.3 Allowable Pressure Drop. The design pressure loss in a piping system from the point of delivery to the inlet connection of all appliances served shall be such that the supply pressure at each appliance inlet is greater than or equal to the minimum pressure required by the appliance. [NFPA 5.5.4]

1208.5 Maximum Operating Pressure in Buildings. The maximum operating pressure for any piping systems located inside buildings shall not exceed 5 psi (34 kPa) unless one or more of the following conditions are met:

1. The piping joints are welded or brazed.
2. The piping is joined by fittings listed to ANSI LC 4/CSA 6.32 and installed according to the manufacturer’s installation instructions.
3. The piping joints are flanged and all pipe-to-flange connections are made by welding or brazing.
4. The piping is located in a ventilated chase or otherwise enclosed for protection against accidental gas accumulation.
5. The piping is located inside buildings or separate areas of buildings used exclusively for one of the following:
   a. Industrial processing or heating
   b. Research
   c. Warehousing
   d. Boiler or mechanical rooms
6. The piping is a temporary installation for buildings under construction.
7. The piping serves appliances or equipment used for agricultural purposes.
8. The piping system is an LP-Gas piping system with an operating pressure greater than 20 psi (138 kPa) and complies with NFPA 58. [NFPA 5.5.4.4]

1208.5.1 LP-Gas Systems Operating Below -5°F (-21°C). LP-Gas systems designed to operate below -5°F (-21°C) or with butane or a propane-butane mix shall be designed to either accommodate liquid LP-Gas or to prevent LP-Gas vapor from condensing back into a liquid. [NFPA 5.5.4.5]

1208.6 Acceptable Piping Materials and Joining Methods. Materials used for piping systems shall either comply with the requirements of this chapter or be acceptable to the Authority Having Jurisdiction. [NFPA 5.5.1.1]

1208.6.1 Used Materials. Pipe, fittings, valves, or other materials shall not be used again unless they are free of foreign materials and have been ascertained to be adequate for the service intended. [NFPA 5.5.1.2]

1208.6.3 Metallic Pipe. Metallic pipe shall be in accordance with the Section 1208.6.3.1 through Section 1208.6.3.4.

1208.6.3.1 Cast Iron. Cast-iron pipe shall not be used. [NFPA 5.5.2.1]

1208.6.3.2 Steel, Stainless Steel, and Wrought-Iron Pipe. Steel, stainless steel, and wrought-iron pipe shall be at least Schedule 40 and shall comply with the dimensional standards of ASME B36.10M and one of the following:

1. ASTM A53
2. ASTM A106
3. ASTM A312

1208.6.3.3 Copper and Copper Alloy Pipe. Copper and copper alloy pipe shall not be used if the gas contains more than an average of 0.3 grains of hydrogen sulfide per 100 standard cubic feet (scf) of gas (0.7 mg/100 L). Threaded copper, copper alloy, or aluminum alloy pipe shall not be used with gases corrosive to such material. [NFPA 5.5.2.3 – 5.5.2.4]

1208.6.3.4 Aluminum Alloy Pipe. Aluminum alloy pipe shall comply with ASTM B241 (except that the use of alloy 5456 is prohibited), and shall be marked at each end of each length indicating compliance. Aluminum alloy pipe shall be coated to protect against external corrosion where it is in contact with masonry, plaster, or insulation or is subject to
repeated wettings by such liquids as water, detergents, or sewage. [NFPA 54:5.5.2.5]
Aluminum alloy pipe shall not be used in exterior locations or underground. [NFPA 54:5.5.2.6]

1208.6.4 Metallic Tubing. Tubing shall not be used with gases corrosive to the tubing material. [NFPA 54:5.5.3.1]
1208.6.4.1 Steel Tubing. Steel tubing shall comply with ASTM A254. [NFPA 54:5.5.3.2]
1208.6.4.2 Stainless Steel. Stainless steel tubing shall comply with one of the following:
(1) ASTM A268
(2) ASTM A269 [NFPA 54:5.5.3.3]

1208.6.4.3 Copper and Copper Alloy Tubing. Copper and copper alloy tubing shall not be used if the gas contains more than an average of 0.3 grains of hydrogen sulfide per 100 scf of gas (0.7 mg/100 L). Copper tubing shall comply with standard Type K or Type L of ASTM B88 or ASTM B280. [NFPA 54:5.5.3.4]

1208.6.4.4 Aluminum Alloy Tubing. Aluminum alloy tubing shall comply with ASTM B210 or ASTM B241. Aluminum alloy tubing shall be coated to protect against external corrosion where it is in contact with masonry, plaster, or insulation or is subject to repeated wettings by such liquids as water, detergent, or sewage. Aluminum alloy tubing shall not be used in exterior locations or underground. [NFPA 54:5.5.3.5]

1208.6.4.5 Corrugated Stainless Steel Tubing. Corrugated stainless steel tubing shall be listed in accordance with CSA LC 1. [NFPA 54:5.5.3.6]

1208.6.5 Plastic Pipe, Tubing, and Fittings. Polyethylene plastic pipe, tubing, and fittings used to supply fuel gas shall conform to ASTM D2513. Pipe to be used shall be marked “gas” and “ASTM D2513.” Polyamide pipe, tubing, and fittings shall be identified in and conform to ASTM F2945. Polyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) plastic pipe, tubing, and fittings shall not be used to supply fuel gas. [NFPA 54:5.5.4.1.1 – 5.5.4.1.3]

1208.6.6 Regulator Vent Piping. Plastic pipe and fittings used to connect regulator vents to remote vent terminations shall be PVC conforming to UL 654 (Schedule 40 and 80). PVC vent piping shall not be installed indoors. [NFPA 54:5.5.4.4]

1208.6.7.1 Factory-Assembled Anodeless Risers. Factory-assembled anodeless risers shall be recommended by the manufacturer for the gas used and shall be leak tested by the manufacturer in accordance with written procedures. [NFPA 54:5.5.4.3(1)]

1208.6.7.2 Service Head Adapters and Field-Assembled Anodeless Risers. Service head adapters and field-assembled anodeless risers incorporating service head adapters shall be recommended by the manufacturer for the gas used and shall be design-certified to meet the requirements of Category I of ASTM D2513 and 49 CFR 192.281(e). The manufacturer shall provide the user qualified installation instructions as prescribed by 49 CFR 192.283(b). [NFPA 54:5.5.4.3(3)]

1208.6.7.3 Undiluted Liquified Petroleum Gas Piping. The use of plastic pipe, tubing, and fittings in undiluted LP-Gas piping systems shall be in accordance with NFPA 58. [NFPA 54:5.5.4.3(3)]

1208.6.8 Workmanship and Defects. Gas pipe, tubing, and fittings shall be clear and free from cutting burrs and defects in structure or threading and shall be thoroughly brushed and chip and scale blown. Defects in pipe, tubing, and fittings shall not be repaired. Defective pipe, tubing, and fittings shall be replaced. [NFPA 54:5.5.5]

1208.6.9 Metallic Pipe Threads. Metallic pipe and fitting threads shall be taper pipe threads and shall comply with ASME B1.20.1. [NFPA 54:5.5.6.1]

1208.6.9.1 Damaged Threads. Pipe with threads that are stripped, chipped, corroded, or otherwise damaged shall not be used. Where a weld opens during the operation of cutting or threading, that portion of the pipe shall not be used. [NFPA 54:5.5.6.2]

1208.6.9.2 Number of Threads. Field threading of metallic pipe shall be in accordance with Table 1208.6.9.2. [NFPA 54:5.5.6.3]

1208.6.9.3 Thread Joint Sealing. Threaded joints shall be made using a thread joint sealing material. [NFPA 54:5.5.6.4.1] Thread joint sealing materials shall be compatible with the pipe and fitting material on which the compounds are used. [NFPA 54: 5.5.6.4.2] Thread joint sealing materials shall be resistant to the chemical constituents of the gases to be conducted through the piping. [NFPA 54:5.5.6.4.3]

1208.6.10 Metallic Piping Joints and Fittings. The type of piping joint used shall be suitable for the pressure and temperature conditions and shall be selected giving consideration to joint tightness and mechanical strength under the service conditions. The joint shall be able to sustain the maximum end force due to the internal pressure and any additional forces due to temperature expansion or contraction, vibration, fatigue, or the weight of the pipe and its contents. [NFPA 54:5.5.7]

1208.6.10.1 Pipe Joints. Schedule 40 and heavier pipe joints shall be threaded, flanged, brazed, welded, or assembled with press-connect fittings listed to CSA LC 4.
(1) Where nonferrous pipe is brazed, the brazing materials shall have a melting point in excess of 1000°F (538°C). (2) Brazing alloys shall not contain more than 0.05 percent phosphorus. [NFPA 54:5.5.7.1]

1208.6.10.2 Copper Tubing Joints. Copper tubing joints shall be assembled with approved gas tubing fittings, shall be brazed with a material having a melting point in excess of 1000°F (538°C), or shall be assembled with press-connect fittings listed to CSA LC 4. Brazing alloys shall not contain more than 0.05 percent phosphorus. [NFPA 54:5.5.7]

1208.6.10.3 Stainless Steel Tubing Joints. Stainless steel joints shall be welded, assembled with approved tubing fittings, brazed with a material having a melting point in excess of 1000°F (538°C), or assembled with press-connect fittings listed to CSA LC 4. Brazing alloys and fluxes shall be recommended by the manufacturer for use on stainless steel alloys. [NFPA 54:5.5.7.3]

1208.6.10.4 Flared Joints. Flared joints shall be used only in systems constructed from nonferrous pipe and tubing where experience or tests have demonstrated that the joint is suitable for the conditions and where provisions are made
1208.6.10.5 Metallic Pipe Fittings. Metallic fittings shall comply with the following:

1. Threaded fittings in sizes larger than 4 inches (100 mm) shall not be used.
2. Fittings used with steel, stainless steel, or wrought-iron pipe shall be steel, stainless steel, copper alloy, malleable iron, or cast iron.
3. Fittings used with copper or copper alloy pipe shall be copper or copper alloy.
4. Fittings used with aluminum alloy pipe shall be aluminum alloy.
5. Cast-iron fittings shall comply with the following:
   a. Flanges shall be permitted.
   b. Bushings shall not be used.
   c. Fittings shall not be used in systems containing flammable gas-air mixtures.
   d. Fittings in sizes 4 inches (100 mm) and larger shall not be used indoors unless approved by the Authority Having Jurisdiction.
   e. Fittings in sizes 6 inches (150 mm) and larger shall not be used unless approved by the Authority Having Jurisdiction.
6. Aluminum alloy fitting threads shall not form the joint seal.
7. Zinc-aluminum alloy fittings shall not be used in systems containing flammable gas-air mixtures.
8. Special fittings such as couplings, proprietary-type joints, saddle tees, gland-type compression fittings, and flared, flareless, or compression-type tubing fittings shall be as follows:
   a. Used within the fitting manufacturer’s pressure-temperature recommendations.
   b. Used within the service conditions anticipated with respect to vibration, fatigue, thermal expansion, or contraction.
   c. Acceptable to the Authority Having Jurisdiction.

9. When pipe fittings are drilled and tapped in the field, the operation shall be in accordance with the following:
   a. The operation shall be performed on systems having operating pressures of 5 psi (34 kPa) or less.
   b. The operation shall be performed by the gas supplier or their designated representative.
   c. The drilling and tapping operation shall be performed in accordance with written procedures prepared by the gas supplier.
   d. The fittings shall be located outdoors.
   e. The tapped fitting assembly shall be inspected and proven to be free of leaks.

1208.6.11 Plastic Piping Joints and Fittings. Plastic pipe, tubing, and fittings shall be joined in accordance with the manufacturers’ instructions. Section 1208.6.11.1 through Section 1208.6.11.4 shall be observed when making such joints. [NFPA 54: 5.5.8]

1208.6.11.1 Joint Design. The joint shall be designed and installed so that the longitudinal pullout resistance of the joint will be at least equal to the tensile strength of the plastic piping material. [NFPA 54: 5.5.8(1)]

1208.6.11.2 Heat Fusion Joint. Heat fusion joints shall be made in accordance with qualified procedures that have been established and proven by test to produce gastight joints at least as strong as the plastic piping material. Joints shall be made with the joining method recommended by the pipe manufacturer. Polyethylene heat fusion fittings shall be marked “ASTM D2513.” Polyamide heat fusion fittings shall be marked “ASTM F2945.” [NFPA 54: 5.5.8(2)]

1208.6.11.3 Compression-Type Mechanical Joints. Where compression-type mechanical joints are used, the gasket material in the fitting shall be compatible with the plastic piping and with the gas distributed by the system. An internal tubular rigid stiffener shall be used in conjunction with the fitting. The stiffener shall be flush with the end of the pipe or tubing and shall extend at least to the outside end of the compression fitting when installed. The stiffener shall be free of rough or sharp edges and shall not be a force fit in the plastic. Split tubular stiffeners shall not be used. [NFPA 54: 5.5.8(3)]

1208.6.11.4 Liquefied Petroleum Gas Piping Systems. Plastic piping joints and fittings for use in LP-Gas piping systems shall be in accordance with NFPA 58. [NFPA 54: 5.5.8(4)]

1208.6.12.1 Cast Iron Flanges. Cast iron flanges shall be in accordance with ASME B16.1. [NFPA 54: 5.5.9.1.1]

1208.6.12.2 Steel Flanges. Steel flanges shall be in accordance with the following:

1. ASME B16.5 or ASME B16.47. [NFPA 54: 5.5.9.1.2]

1208.6.12.3 Non-Ferrous Flanges. Non-ferrous flanges shall be in accordance with ASME B16.24. [NFPA 54: 5.5.9.1.3]

1208.6.12.4 Ductile Iron Flanges. Ductile iron flanges shall be in accordance with ASME B16.42. [NFPA 54: 5.5.9.1.4]

1208.6.12.5 Dissimilar Flange Connections. Raised-face flanges shall not be joined to flat-faced cast iron, ductile iron or nonferrous material flanges. [NFPA 54: 5.5.9.2]

1208.6.12.6 Flange Facings. Standard facings shall be permitted for use under this code. Where 150 psi (1034 kPa) steel flanges are bolted to Class 125 cast-iron flanges, the raised face on the steel flange shall be removed. [NFPA 54: 5.5.9.3]

1208.6.12.7 Lapped Flanges. Lapped flanges shall be used only aboveground or in exposed locations accessible for inspection. [NFPA 54: 5.5.9.4]

1208.6.13 Flange Gaskets. The material for gaskets shall be capable of withstanding the design temperature and pressure of the piping system and the chemical constituents of the gas being conducted without change to its chemical and physical properties. The effects of fire exposure to the joint shall be considered in choosing the material. [NFPA 54: 5.5.10]

1208.6.13.1 Flange Gasket Materials. Acceptable materials shall include the following:

1. Metal (plain or corrugated)
2. Composition
3. Aluminum "O" rings
(4) Spiral-wound metal gaskets
(5) Rubber-faced phenolic
(6) Elastomeric [NFPA 54:5.5.10.1]

1208.6.13.2 Metallic Flange Gaskets. Metallic flange gaskets shall be in accordance with ASME B16.20. [NFPA 54:5.5.10.2.1]

1208.6.13.3 Non-Metallic Flange Gaskets. Non-metallic flange gaskets shall be in accordance with ASME B16.21. [NFPA 54:5.5.10.2.2]

1208.6.13.4 Full-Face Flange Gasket. Full-face flange gaskets shall be used with all non-steel flanges. [NFPA 54:5.5.10.3]

1208.6.13.5 Separated Flanges. When a flanged joint is separated, the gasket shall be replaced. [NFPA 54:5.5.10.4]

1208.7 Gas Meters. Gas meters shall be selected for the maximum expected pressure and permissible pressure drop. [NFPA 54:5.6.1]

1208.7.1 Location. Gas meters shall be located in ventilated spaces readily accessible for examination, reading, replacement, or necessary maintenance. [NFPA 54:5.6.2.1]

1208.7.1.1 Protection from Damage. Gas meters shall not be placed where they will be subjected to damage, such as adjacent to a driveway, under a fire escape, in public passages, halls, or where they will be subject to excessive corrosion or vibration. [NFPA 54:5.6.2.2]

1208.7.1.2 Extreme Temperatures. Gas meters shall not be located where they will be subjected to extreme temperatures or sudden extreme changes in temperature or in areas where they are subjected to temperatures beyond those recommended by the manufacturer. [NFPA 54:5.6.2.3]

1208.7.2 Supports. Gas meters shall be supported or connected to rigid piping so as not to exert a strain on the meters. Where flexible connectors are used to connect a gas meter to downstream piping at mobile homes in mobile home parks, the meter shall be supported by a post or bracket placed in a firm footing or by other means providing equivalent support. [NFPA 54:5.6.3]

1208.7.3 Meter Protection. Meters shall be protected against overpressure, backpressure, and vacuum. [NFPA 54:5.6.4]

1208.7.4 Identification. Gas piping at multiple meter installations shall be marked by a metal tag or other permanent means designating the building or the part of the building being supplied and attached by the installing agency. [NFPA 54:5.6.5]

1208.8 Gas Pressure Regulators. A line pressure regulator shall be installed where the gas supply pressure exceeds the maximum allowable inlet pressure of the appliance served. [NFPA 54:5.7.1]

1208.8.1 Listing. Line pressure regulators shall be listed in accordance with CSA Z21.80 where the outlet pressure is set to 2 psi (14 kPa) or less. [NFPA 54:5.7.2]

1208.8.2 Location. The gas pressure regulator shall be accessible for servicing. [NFPA 54:5.7.3]

1208.8.3 Regulator Protection. Pressure regulators shall be protected against physical damage. [NFPA 54:5.7.4]

1208.8.4 Regulator Vents. Regulator vents shall be in accordance with Section 1208.16. [NFPA 54:5.7.5]

1208.8.8 Identification. Line pressure regulators at multiple regulator installations shall be marked by a metal tag or other permanent means designating the building or the part of the building being supplied. [NFPA 54:5.7.6]

1208.9 Overpressure Protection Required. Where the serving gas supplier delivers gas at a pressure greater than 2 psi (14 kPa) for piping systems serving appliances designed to operate at a gas pressure of 14 inches water column (3.5 kPa) or less, overpressure protection devices shall be installed. Piping systems serving equipment designed to operate at inlet pressures greater than 14 inches water column (3.5 kPa) shall be equipped with overpressure protection devices as required by the appliance manufacturer’s installation instructions. [NFPA 54:5.8.1]

1208.10 Overpressure Protection Devices. Overpressure protection devices shall be one of the following:

1208.10.1 Separate Devices. The devices in Section 1208.10 shall be installed either as an integral part of the service or line pressure regulator or as separate units. Where separate overpressure protection devices are installed, they shall comply with Section 1208.10.2 through Section 1208.10.7. [NFPA 54:5.8.3.2]

1208.10.2 Construction and Installation. All overpressure protection devices shall meet the following requirements:

1208.10.3 External Control Piping. External control piping shall be designed and installed so that damage to the control piping of one device does not render both the regulator and the overpressure protective device inoperative. [NFPA 54:5.8.5]

1208.10.4 Setting. Each pressure limiting or pressure relieving device shall be set so that the gas pressure supplied to the connected appliance(s) does not exceed the limits specified in Section 1208.11 and Section 1208.11.1. [NFPA 54:5.8.6]

1208.10.5 Unauthorized Operation. Where unauthorized operation of any shutoff valve could render a pressure relieving valve or pressure limiting device inoperative, one of the following shall be accomplished:
1208.10.6 Discharge of Vents. The discharge stacks, vents, or outlet parts of all pressure relieving and pressure limiting devices shall be located so that gas is safely discharged to the outdoors. Discharge stacks or vents shall be designed to prevent the entry of water, insects, or other foreign material that could cause blockage. The discharge stack or vent line shall be at least the same size as the outlet of the pressure relieving device. [NFPA 54:5.8.8.1 – 5.8.8.2]

1208.10.7 Size of Fittings, Pipe, and Openings. The fittings, pipe, and openings located between the system to be protected and the pressure relieving device shall be sized to prevent hammering of the valve and to prevent impairment of relief capacity. [NFPA 54:5.8.9]

1208.11 Pressure Limitation Requirements. Where piping systems serving appliances designed to operate with a gas supply pressure of 14 inches water column (3.5 kPa) or less are required to be equipped with overpressure protection by Section 1208.9, each overpressure protection device shall be adjusted to limit the gas pressure to each connected appliance to 2 psi (14 kPa) or less upon a failure of the line pressure regulator. [NFPA 54:5.8.2.1]

1208.11.1 Overpressure Protection Required. Where piping systems serving appliances designed to operate with a gas supply pressure greater than 14 inches water column (3.5 kPa) are required to be equipped with overpressure protection by Section 1208.9, each overpressure protection device shall be adjusted to limit the gas pressure to each connected appliance as required by the appliance manufacturer's installation instructions. [NFPA 54:5.8.2.2]

1208.11.2 Overpressure Protection Devices. Each overpressure protection device installed to meet the requirements of this section shall be capable of limiting the pressure to its connected appliance(s) as required by this section independently of any other pressure control equipment in the piping system. [NFPA 54:5.8.2.3]

1208.11.3 Detection of Failure. Each gas piping system for which an overpressure protection device is required by this section shall be designed and installed so that a failure of the primary pressure control device(s) is detectable. [NFPA 54:5.8.2.4]

1208.11.4 Flow Capacity. If a pressure relief valve is used to meet the requirements of this section, it shall have a flow capacity such that the pressure in the protected system is maintained at or below the limits specified in Section 1208.11 under the following conditions:

1. The line pressure regulator for which the relief valve is providing overpressure protection has failed wide open.
2. The gas pressure at the inlet of the line pressure regulator for which the relief valve is providing overpressure protection is not less than the regulator's normal operating inlet pressure. [NFPA 54:5.8.2.5]

1208.12 Backpressure Protection. Protective devices shall be installed as close to the equipment as practical where the design of equipment connected is such that air, oxygen, or standby gases could be forced into the gas supply system.

Gas and air combustion mixers incorporating double diaphragm “zero” or “atmosphere” governors or regulators shall require no further protection unless connected directly to compressed air or oxygen at pressures of 5 psi (34 kPa) or more. [NFPA 54:5.9.1.1 – 5.9.1.2]

1208.12.1 Protective Devices. Protective devices shall include but not be limited to the following:

1. Check valves
2. Three-way valves (of the type that completely closes one side before starting to open the other side)
3. Reverse flow indicators controlling positive shutoff valves
4. Normally closed air-actuated positive shutoff pressure regulators [NFPA 54:5.9.2]

1208.13 Low-Pressure Protection. A protective device shall be installed between the meter and the appliance or equipment if the operation of the appliance or equipment is such that it could produce a vacuum or a dangerous reduction in gas pressure at the meter. Such protective devices include, but are not limited to, mechanical, diaphragm-operated, or electrically operated low-pressure shutoff valves. [NFPA 54:5.10]

1208.14 Shutoff Valves. Shutoff valves shall be selected in accordance with Table 1208.14. Shutoff valves of size 1 inch (25 mm) National Pipe Thread and smaller shall be listed and labeled. Where used outdoors, such use shall be in accordance with the manufacturer's recommendation. [NFPA 54:5.11]

1208.15 Expansion and Flexibility. Piping systems shall be designed to prevent failure from thermal expansion or contraction. [NFPA 54:5.13.1]

1208.15.1 Special Local Conditions. Where local conditions include earthquake, tornado, unstable ground, or flood hazards, special consideration shall be given to increased strength and flexibility of piping supports and connections. [NFPA 54:5.13.2]

1208.16 Pressure Regulator and Pressure Control Venting. The venting of the atmospheric side of diaphragms in line pressure regulators, gas appliance regulators, and gas pressure limit controls shall be in accordance with all of the following:

1. An independent vent pipe to the outdoors, sized in accordance with the device manufacturer's instructions, shall be provided where the location of a device is such that a discharge of fuel gas will cause a hazard. For devices other than appliance regulators, vents are not required to be independent where the vents are connected to a common manifold designed in accordance with engineering methods to minimize backpressure in the event of diaphragm failure and such design is approved.

Exceptions:

1. A regulator and vent limiting means combination listed as complying with ANSI Z21.80/CSA 6.22, shall not be required to be vented to the outdoors.
2. A listed gas appliance regulator factory equipped with a vent limiting device is not required to be vented to the outdoors.

...
outdoors.
(2) Materials for vent piping shall be in accordance with Section 1208.6 through Section 1208.6.13.5.
(3) The vent terminus shall be designed to prevent the entry of water, insects, and other foreign matter that could cause blockage.
(4) Vent piping shall be installed to minimize static loads and bending moments placed on the regulators and gas pressure control devices.
(5) Vents shall terminate not less than 3 feet (914 mm) from a possible source of ignition.
(6) At locations where a vent termination could be submerged during floods or snow accumulations, an antiflood-type breather vent fitting shall be installed, or the vent terminal shall be located above the height of the expected flood waters or snow.
(7) Vent piping from pressure regulators and gas pressure controls shall not be connected to a common manifold that serves a bleed line from a diaphragm-type gas valve. [NFPA 54:5.14]

1209.1 General. Where automatic excess flow valves are installed, they shall be listed in accordance with ANSI Z21.93/CSA 6.30 and shall be sized and installed in accordance with the manufacturers’ instructions. [NFPA 54:5.12]

1210.1 Piping Underground. Underground gas piping shall be installed with sufficient clearance from any other underground structure to avoid contact therewith, to allow maintenance, and to protect against damage from proximity to other structures. Underground plastic piping shall be installed with sufficient clearance or shall be insulated from any source of heat so as to prevent the heat from impairing the serviceability of the pipe. [NFPA 54:7.1.1.1 – 7.1.1.2]

1210.1.1 Cover Requirements. Underground piping systems shall be installed with a minimum of 12 inches (305 mm) of cover. The minimum cover shall be increased to 18 inches (457 mm) if external damage to the pipe or tubing from external forces is likely to result. Where a minimum of 12 inches (305 mm) of cover cannot be provided, the piping shall be installed in conduit. [NFPA 54:7.1.2.1 – 7.1.2.1(B)]

1210.1.5 Piping through Foundation Wall. Piping through a foundation wall shall comply with all of the following:
(1) Underground piping, where installed through the outer foundation or basement wall of a building, shall be encased in a protective sleeve or protected by an approved device or method.
(2) The spaces between the gas piping and the sleeve and between the sleeve and the wall shall be sealed to prevent entry of gas and water.
(3) Sealing materials shall be compatible with the piping and sleeve. [NFPA 54:7.1.5]

1210.1.7 Connections of Plastic Piping. Plastic piping shall be installed outdoors, underground only. Exceptions:
(1) Plastic piping shall be permitted to terminate aboveground where an anodeless riser is used.
(2) Plastic piping shall be permitted to terminate with a wall head adapter aboveground in buildings, including basements, where the plastic piping is inserted in a piping material permitted for use in buildings. [NFPA 54:7.1.7.1]

1210.3 Installation of Aboveground Piping. Piping installed aboveground shall comply with all of the following:
(1) Piping shall be securely supported and located where it will be protected from physical damage.
(2) Where passing through an exterior wall, the piping shall also be protected from corrosion by coating or wrapping with an inert material approved for such applications.
(3) The piping shall be sealed around its circumference at the point of the exterior penetration to prevent the entry of water, insects, and rodents.
(4) Where piping is encased in a protective pipe sleeve, the annular spaces between the gas piping and the sleeve and between the sleeve and the wall opening shall be sealed.
(5) Piping installed outdoors shall be elevated not less than 3½ inches (89 mm) above the ground.
(6) Sealing materials shall be compatible with the piping and sleeve. [NFPA 54:7.2.1]

1210.3.5.3 Piping on Roofs. Gas piping installed on the roof surfaces shall be supported in accordance with Table 1210.3.5.1. Gas piping shall be elevated not less than 3½ inches (89 mm) above the roof surface. [NFPA 54:7.2.6.4.1, 7.2.6.4.2]

1210.4.4 Industrial Occupancies. In industrial occupancies, gas piping in solid floors such as concrete shall be laid in channels in the floor and covered to permit access to the piping with a minimum of damage to the building. Where piping in floor channels could be exposed to excessive moisture or corrosive substances, the piping shall be protected in an approved manner. [NFPA 54:7.3.5.1]

1210.4.5 Other Occupancies. In other than industrial occupancies and where approved by the Authority Having Jurisdiction, gas piping embedded in concrete floor slabs constructed with portland cement shall be surrounded with a minimum of 1½ inches (38 mm) of concrete and shall not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. All piping, fittings, and risers shall be protected against corrosion in accordance with Section 1210.3.1. Piping shall not be embedded in concrete slabs containing quickset additives or cinder aggregate. [NFPA 54:7.3.5.2]

1210.9 Manual Gas Shutoff Valves. An accessible gas shutoff valve shall be provided upstream of each gas pressure regulator. Where two gas pressure regulators are installed in series in a single gas line, a manual valve shall not be required at the second regulator. [NFPA 54:7.8.2]

1210.9.1 Accessibility of Gas Valves. System shutoff valves shall be readily accessible for operation and installed so
as to be protected from physical damage. System shutoff valves shall be marked with a metal tag or other permanent means attached by the installing agency so that the gas piping systems supplied through them can be readily identified. [NFPA 54:7.8.1.1 – 7.8.1.2]

1210.9.2 Shutoff Valves for Multiple House Lines. In multiple-tenant buildings supplied through a master meter, through one service regulator where a meter is not provided, or where meters or service regulators are not readily accessible from the appliance or equipment location, an individual shutoff valve for each apartment or tenant line shall be provided at a convenient point of general accessibility. In a common system serving a number of individual buildings, shutoff valves shall be installed at each building. [NFPA 54:7.8.3.1]

1210.9.3 Emergency Shutoff Valves. An exterior shutoff valve to permit turning off the gas supply to each building in an emergency shall be provided. The emergency shutoff valves shall be plainly marked as such and their locations posted as required by the Authority Having Jurisdiction. [NFPA 54:7.8.3.2]

1210.9.4 Shutoff Valve for Laboratories. Each laboratory space containing two or more gas outlets installed on tables, benches, or in hoods in educational, research, commercial and industrial occupancies shall have a single shutoff valve through which all such gas outlets are supplied. The shutoff valve shall be accessible, located within the laboratory or adjacent to the laboratory’s egress door, and identified. [NFPA 54:7.8.3.3]

1210.9.5 System Shutoff Valves. Where a system shutoff valve is installed, the valve shall comply with Section 1208.14. [NFPA 54:7.8.8.4]

1210.12.5 Installation of Gas-Mixing Machines. Installation of gas-mixing machines shall comply with Section 1210.12.5.1 through Section 1210.12.5.5.

1210.12.5.1 Location. The gas-mixing machine shall be located in a well-ventilated area or in a detached building or cutoff room provided with room construction and explosion vents in accordance with engineering methods. Such rooms or below-grade installations shall have adequate positive ventilation. [NFPA 54:7.11.5.1]

1210.12.5.2 Electrical Requirements. Where gas-mixing machines are installed in well-ventilated areas, the type of electrical equipment shall be in accordance with NFPA 70 for general service conditions unless other hazards in the area prevail. Where gas-mixing machines are installed in small detached buildings or cutoff rooms, the electrical equipment and wiring shall be installed in accordance with NFPA 70 for hazardous locations (Articles 500 and 501, Class I, Division 2). [NFPA 54:7.11.5.2]

1210.12.5.3 Air Intakes. Air intakes for gas-mixing machines using compressors or blowers shall be taken from outdoors whenever practical. [NFPA 54:7.11.5.3]

1210.12.5.4 Controls. Controls for gas-mixing machines shall include interlocks and a safety shutoff valve of the manual reset type in the gas supply connection to each machine arranged to automatically shut off the gas supply in the event of high or low gas pressure. Except for open burner installations only, the controls shall be interlocked so that the blower or compressor stops operating following a gas supply failure. Where a system employs pressurized air, means shall be provided to shut off the gas supply in the event of air failure. [NFPA 54:7.11.5.4]

1210.12.5.5 Installation in Parallel. Centrifugal gas-mixing machines in parallel shall be reviewed by the user and equipment manufacturer before installation, and means or plans for minimizing the effects of downstream pulsation and equipment overload shall be prepared and utilized as needed. [NFPA 54:7.11.5.5]

1210.12.6 Use of Automatic Firechecks, Safety Blowouts, or Backfire Preventers. Automatic firechecks and safety blowouts or backfire preventers shall be provided in piping systems distributing flammable air-gas mixtures from gas-mixing machines to protect the piping and the machines in the event of flashback, in accordance with the following:

1. Approved automatic firechecks shall be installed upstream as close as practical to the burner inlets following the firecheck manufacturer’s instructions.
2. A separate manually operated gas valve shall be provided at each automatic firecheck for shutting off the flow of the gas-air mixture through the firecheck after a flashback has occurred. The valve shall be located upstream as close as practical to the inlet of the automatic firecheck.

Caution: These valves shall not be reopened after a flashback has occurred until the firecheck has cooled sufficiently to prevent re-ignition of the flammable mixture and has been reset properly.

3. A safety blowout or backfiring preventer shall be provided in the mixture line near the outlet of each gas-mixing machine where the size of the piping is larger than 2 1/2 inches (65 mm) NPS, or equivalent, to protect the mixing equipment in the event of an explosion passing through an automatic firecheck. The manufacturers’ instructions shall be followed when installing these devices, particularly after a disc has burst. The discharge from the safety blowout or backfire preventer shall be located or shielded so that particles from the ruptured disc cannot be directed toward personnel. Wherever there are interconnected installations of gas-mixing machines with safety blowouts or backfire preventers, provision shall be made to keep the mixture from other machines from reaching any ruptured disc opening. Check valves shall not be used for this purpose.

4. Large-capacity premix systems provided with explosion heads (rupture discs) to relieve excessive pressure in pipelines shall be located at and vented to a safe outdoor location. Provisions shall be provided for automatically shutting off the supply of the gas-air mixture in the event of rupture. [NFPA 54:7.11.6]

1211.4 Prohibited Use. Gas piping shall not be used as a grounding conductor or electrode. [NFPA 54:7.12.4.1]

1212.1 Connecting Appliances and Equipment. Appliances and equipment shall be connected to the building piping in compliance with Section 1212.6 through Section 1212.8 by one of the following:

1. Rigid metallic pipe and fittings.
2. Semirigid metallic tubing and metallic fittings. Aluminum alloy tubing shall not be used in exterior locations.
3. A connector for gas appliances listed in accordance with ANSI Z21.24/CSA 6.27. The connector shall be used in accordance with the manufacturer’s installation instructions and shall be in the same room as the appliance. Only one
connector shall be used per appliance.

(4) A connector for outdoor gas appliances and manufactured homes listed in accordance with ANSI Z21.75/CSA 6.27. Only one connector shall be used per appliance.

(5) CSST where installed in accordance with the manufacturer’s installation instructions. CSST shall not be directly routed into a metallic appliance enclosure where the appliance is connected to a metallic vent that terminates above a roofline. CSST shall connect only to appliances that are fixed in place.

(6) Listed nonmetallic gas hose connectors in accordance with Section 1212.3.

(7) Unlisted gas hose connectors for use in laboratories and educational facilities in accordance with Section 1212.4. [NFPA 54:9.6.1.3]

1212.1.1 Food Service Appliance Connectors. Connectors used with food service appliances that are moved for cleaning and sanitation purposes shall be installed in accordance with the connector manufacturer’s installation instructions. Such connectors shall be listed in accordance with ANSI Z21.69/CSA 6.16. [NFPA 54:9.6.1.3]

1212.7 Quick-Disconnect Devices. Quick-disconnect devices used to connect appliances to the building piping shall be listed in accordance with ANSI Z21.41/CSA 6.9. Where installed indoors, an approved manual shutoff valve with a nondisplaceable valve member shall be installed upstream of the quick-disconnect device. [NFPA 54:9.6.6.1 – 9.6.6.2]

TABLE 1208.4.1
APPROXIMATE GAS INPUT FOR TYPICAL APPLIANCES
[NFPA 54: TABLE A.5.3.2.1]

<table>
<thead>
<tr>
<th>APPLIANCE</th>
<th>INPUT (Btu/h approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Space Heating Units</strong></td>
<td></td>
</tr>
<tr>
<td>Warm air furnace</td>
<td>100 000</td>
</tr>
<tr>
<td>Single family</td>
<td>60 000</td>
</tr>
<tr>
<td>Multifamily, per unit</td>
<td>100 000</td>
</tr>
<tr>
<td>Hydronic boiler</td>
<td>60 000</td>
</tr>
<tr>
<td><strong>Space and Water Heating Units</strong></td>
<td></td>
</tr>
<tr>
<td>Hydronic boiler</td>
<td>120 000</td>
</tr>
<tr>
<td>Single-family</td>
<td>75 000</td>
</tr>
<tr>
<td>Multifamily, per unit</td>
<td>75 000</td>
</tr>
<tr>
<td><strong>Water Heating Appliances</strong></td>
<td></td>
</tr>
<tr>
<td>Water heater, automatic storage 30 to 40 gallon tank</td>
<td>35 000</td>
</tr>
<tr>
<td>Water heater, automatic storage 50 gallon tank</td>
<td>50 000</td>
</tr>
<tr>
<td>Water heater, automatic instantaneous Capacity at 2 gallons per minute</td>
<td>142 800</td>
</tr>
<tr>
<td>Capacity at 4 gallons per minute</td>
<td>285 000</td>
</tr>
<tr>
<td>Capacity at 6 gallons per minute</td>
<td>428 400</td>
</tr>
<tr>
<td>Water heater, domestic, circulating or side-arm</td>
<td>35 000</td>
</tr>
<tr>
<td><strong>Cooking Appliances</strong></td>
<td></td>
</tr>
<tr>
<td>Range, freestanding, domestic</td>
<td>65 000</td>
</tr>
<tr>
<td>Built-in oven or broiler unit, domestic</td>
<td>25 000</td>
</tr>
<tr>
<td>Built-in top unit, domestic</td>
<td>40 000</td>
</tr>
<tr>
<td><strong>Other Appliances</strong></td>
<td></td>
</tr>
<tr>
<td>Refrigerator</td>
<td>3000</td>
</tr>
<tr>
<td>Clothes dryer, Type 1 (domestic)</td>
<td>35 000</td>
</tr>
<tr>
<td>Gas fireplace direct-vent</td>
<td>40 000</td>
</tr>
<tr>
<td>Gas log</td>
<td>80 000</td>
</tr>
<tr>
<td>Barbecue</td>
<td>40 000</td>
</tr>
<tr>
<td>Gas light</td>
<td>2500</td>
</tr>
</tbody>
</table>

For SI units: 1000 British thermal units per hour = 0.293 kW
### TABLE 1208.6.9.2
SPECIFICATIONS FOR THREADING METALLIC PIPE
[NFPA 54: TABLE 5.5.6.3]

<table>
<thead>
<tr>
<th>IRON PIPE SIZE (inches)</th>
<th>APPROXIMATE LENGTH OF THREADED PORTION (inches)</th>
<th>APPROXIMATE NUMBER OF THREADS TO BE CUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>½</td>
<td>¾</td>
<td>10</td>
</tr>
<tr>
<td>¾</td>
<td>¾</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>7/8</td>
<td>10</td>
</tr>
<tr>
<td>1¼</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>1½</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>2½</td>
<td>1½</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>1½</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>1⁵⁄₈</td>
<td>13</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25.4 mm

### TABLE 1208.14
MANUAL GAS VALVE STANDARDS
[NFPA 54: TABLE 5.11]

<table>
<thead>
<tr>
<th>SHUTOFF VALVE APPLICATION</th>
<th>STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appliance shutoff valve up to ½ psi</td>
<td>ANSI Z21.15/CSA 9.1</td>
</tr>
<tr>
<td></td>
<td>ANSI/ASME B16.44</td>
</tr>
<tr>
<td></td>
<td>ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32</td>
</tr>
<tr>
<td>Valve up to ½ psi</td>
<td>ANSI/ASME B16.44</td>
</tr>
<tr>
<td></td>
<td>ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32</td>
</tr>
<tr>
<td>Valve up to 2 psi</td>
<td>ANSI/ASME B16.44 labeled 2G</td>
</tr>
<tr>
<td></td>
<td>ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32 with ANSI/ASME B16.44 labeled 2G or labeled 5G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32 with ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td>Valve up to 5 psi</td>
<td>ANSI/ASME B16.44 labeled 5G</td>
</tr>
<tr>
<td></td>
<td>ANSI/ASME B16.33</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32 with ANSI/ASME B16.44 marked 5G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32 with ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td>Valve up to 125 psi</td>
<td>ANSI/ASME B16.33 marked 125 G</td>
</tr>
<tr>
<td></td>
<td>ANSI LC 4/CSA 6.32 with ANSI/ASME B16.33 marked 125 G</td>
</tr>
</tbody>
</table>

For SI Units: 1 pound-force per square inch = 6.8947 kPa
### TABLE 1210.3.5.1
SUPPORT OF PIPING
[NFPA 54: TABLE 7.2.6.2]

<table>
<thead>
<tr>
<th>STEEL PIPE, NOMINAL SIZE OF PIPE (inches)</th>
<th>SPACING OF SUPPORTS (feet)</th>
<th>NOMINAL SIZE OF TUBING SMOOTH WALL (inches O.D.)</th>
<th>SPACING OF SUPPORTS (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>½</td>
<td>6</td>
<td>½</td>
<td>4</td>
</tr>
<tr>
<td>¾ or 1</td>
<td>8</td>
<td>5/8 or ¾</td>
<td>6</td>
</tr>
<tr>
<td>1¼ or larger (horizontal)</td>
<td>10</td>
<td>7/8 or 1 (horizontal)</td>
<td>8</td>
</tr>
<tr>
<td>1¼ or larger (vertical)</td>
<td>Every floor level</td>
<td>1 or larger (vertical)</td>
<td>Every floor level</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm

### TABLE 1215.2(27)
SCHEDULE 40 METALLIC PIPE [NFPA 54: TABLE 6.3.1(d)]

<table>
<thead>
<tr>
<th>NOMINAL INSIDE:</th>
<th>½</th>
<th>¾</th>
<th>1</th>
<th>1¼</th>
<th>1½</th>
<th>2</th>
<th>2½</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTUAL:</td>
<td>0.622</td>
<td>0.824</td>
<td>1.049</td>
<td>1.380</td>
<td>1.610</td>
<td>2.067</td>
<td>2.469</td>
<td>3.068</td>
<td>4.026</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LENGTH (feet)</th>
<th>CAPACITY IN THOUSANDS OF BTU PER HOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>291</td>
</tr>
<tr>
<td>20</td>
<td>200</td>
</tr>
<tr>
<td>30</td>
<td>160</td>
</tr>
<tr>
<td>40</td>
<td>137</td>
</tr>
<tr>
<td>50</td>
<td>122</td>
</tr>
<tr>
<td>60</td>
<td>110</td>
</tr>
<tr>
<td>70</td>
<td>101</td>
</tr>
<tr>
<td>80</td>
<td>94</td>
</tr>
<tr>
<td>90</td>
<td>89</td>
</tr>
<tr>
<td>100</td>
<td>84</td>
</tr>
<tr>
<td>125</td>
<td>74</td>
</tr>
<tr>
<td>150</td>
<td>67</td>
</tr>
<tr>
<td>175</td>
<td>62</td>
</tr>
<tr>
<td>200</td>
<td>58</td>
</tr>
<tr>
<td>250</td>
<td>51</td>
</tr>
<tr>
<td>300</td>
<td>46</td>
</tr>
<tr>
<td>350</td>
<td>42</td>
</tr>
<tr>
<td>400</td>
<td>40</td>
</tr>
<tr>
<td>450</td>
<td>37</td>
</tr>
<tr>
<td>STANDARD NUMBER</td>
<td>STANDARD TITLE</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>ASME B16.33-2012 (R2017)</td>
<td>Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 175 psi (Sizes NPS 1/2 through NPS 2)</td>
</tr>
<tr>
<td>ASME B16.44-2012 (R2017)</td>
<td>Manually Operated Metallic Gas Valves for Use in Above Ground Piping Systems up to 5 psi</td>
</tr>
</tbody>
</table>

*Table entries are rounded to 3 significant digits.*

**TABLE 1701.1 REFERENCED STANDARDS**

**COMMITTEE STATEMENT:**
UL 651 is a standard for electric conduit and not vent piping. The reference to UL 651 is being removed to avoid confusion and to avoid the use of an incorrect fuel gas vent piping. Furthermore, the reference to the PVC "Schedule 40 and 80" is needed to prevent the use of thinner materials.

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** **AFFIRMATIVE:** 25 **NOT RETURNED:** 1 Daniels

The TCC has the responsibility to resolve conflicts and achieve correlation among the recommendations of the Technical Committee. The TCC has the authority to choose between alternative text recommended by the Technical Committee, but only as necessary for correlation, consistence, and the correction of errors and omissions in accordance with Section 3-4 of the Regulations Governing Committee Projects.

Actions taken on UPC Item # 246, Section 1208.6.6 (Regulator Vent Piping) and UPC Table 1701.1 (Referenced Standards); and Section 1212.2 (Suspended Low-Intensity Infrared Tube Heaters) and UPC Section 1212.1 (Connecting Appliances and Equipment) resulted in conflicting language between the code. In order to correlate the language, the Technical Correlating Committee proposed the following modifications to the UPC:

**TABLE 1701.1 REFERENCED STANDARDS**
(portions of table not shown remain unchanged)

1212.2 Suspended Low-Intensity Infrared Tube Heaters. Suspended low-intensity infrared tube heaters shall be connected to the building piping system with a connector listed for the application in accordance with ANSI Z21.24/CSA 6.27 CSA Z21.24 as follows:

1. The connector shall be installed in accordance with the tube heater installation instructions and shall be in the same room as the appliance.
2. Only one connector shall be used per appliance. [NFPA 54:9.6.1.5]

TCC ACTION: ACCEPT AS SUBMITTED

TCC STATEMENT:
The UL 651 standard is being stricken from UPC Table 1701.1 (Referenced Standards) to correlate with the actions taken by the UPC TC for Item # 246, Section 1208.6.6 (Regulator Vent Piping) with regards to striking the reference to the UL 651 standard from the section.

Additionally, the language in UPC Section 1212.2 (Suspended Low-Intensity Infrared Tube Heaters) is being revised to correlate with the actions taken by the UPC TC for Item # 246, Section 1212.1 (Connecting Appliances and Equipment) regarding the designation of the CSA standards.

The action moves forward as approved by the TCC and supersedes the recommendation from the UPC TC for actions taken for Table 1701.1 by striking the UL 651 standard, and Section 1212.2 by updating the designation of the CSA standard.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 1212.1.1 Item #: 246
SUBMITTER: IAPMO Staff - Update Extracts NFPA 54 Extract Update
Comment #: 1

RECOMMENDATION:
Revise text

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

1212.0 Appliance and Equipment Connections to Building Piping.
1212.1 Connecting Appliances and Equipment. Appliances and equipment shall be connected to the building piping in compliance with Section 1212.6 through Section 1212.8 by one of the following:

1. Rigid metallic pipe and fittings.
2. Semirigid metallic tubing and metallic fittings. Aluminum alloy tubing shall not be used in exterior locations.
3. A connector for gas appliances listed in accordance with ANSI Z21.24/CSA 6.27. The connector shall be used in accordance with the manufacturer’s installation instructions and shall be in the same room as the appliance. Only one connector shall be used per appliance.
4. A connector for outdoor gas appliances and manufactured homes listed in accordance with ANSI Z21.75/CSA 6.27. Only one connector shall be used per appliance.
5. CSST where installed in accordance with the manufacturer’s installation instructions. CSST shall not be directly routed into a metallic appliance enclosure where the appliance is connected to a metallic vent that terminates above a roofline. CSST shall connect only to appliances that are fixed in place.
6. Listed nonmetallic gas hose connectors in accordance with Section 1212.3.
7. Unlisted gas hose connectors for use in laboratories and educational facilities in accordance with Section 1212.4. [NFPA 54:9.6.1]
**1212.1.1 Protection of Connectors.** Connectors and tubing addressed in Section 1212.1(2), Section 1212.1(3), Section 1212.1(4), Section 1212.1(5), and Section 1212.1(6) shall be installed to be protected against physical and thermal damage. Aluminum alloy tubing and connectors shall be coated to protect against external corrosion where they are in contact with masonry, plaster, or insulation or are subject to repeated wettings by such liquids as detergents, sewage, or water other than rainwater. [NFPA 54:9.6.1.1]

Materials addressed in Section 1212.1(2), Section 1212.1(3), Section 1212.1(4), Section 1212.1(5), and Section 1212.1(6) shall not be installed through an opening in an appliance housing, cabinet, or casing, unless the tubing or connector is protected against damage. [NFPA 54:9.6.1.2]

**SUBSTANTIATION:**
The above sections have been revised to correlate with NFPA 54-2021 (latest version) in accordance with IAPMO's Regulations Governing Committee Projects (Extract Guidelines).
Proposals

Item #: 248

UPC 2024  Section: 1208.6.4.5, Table 1701.1

SUBMITTER: Robert Torbin
OmegaFlex

RECOMMENDATION:
Revise text

1208.6.4 Metallic Tubing. (remaining text unchanged)

1208.6.4.5 Corrugated Stainless Steel Tubing. Corrugated stainless steel tubing shall be listed in accordance with CSA LC 1. [NFPA 54:5.6.3.6] Corrugated stainless steel tubing shall also comply with IAPMO IGC 201 when a listed encasement system is required.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 201-</td>
<td>Polyethylene Sleev-Corrugated Stainless-Steel</td>
<td>Gas Tubing</td>
<td>1208.6.4.5</td>
</tr>
<tr>
<td>2018e1</td>
<td>Tubing for use in Fuel Gas Piping Systems</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
The proposed standard covers polyethylene sleeved-corrugated stainless steel tubing (CSST) which is used in fuel gas systems. PE sleeved CSST have been tested and installed for over 10 years and continues to be installed today. Reference to the proper standard for this product will ensure public health and safety by clearly identifying products that are approved for this application assisting to the installers, inspectors, and other end users of the code.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The term "encasement" may be misinterpreted to be a conduit and its application is not clear.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 24  NEGATIVE: 1  NOT RETURNED: 1  Daniels

EXPLANATION OF AFFIRMATIVE:
BALLANCO: The standard has technical merit. The text needs to clarify the application of the standard.

EXPLANATION OF NEGATIVE:
WHITE: This standard provides solutions to specific gas installations and should be included in the code.

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 1208.5.3.5  Item #: 248

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

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

1208.0 Gas Piping System Design, Materials, and Components.

1208.5 Acceptable Piping Materials and Joining Methods. (remaining text unchanged)

1208.5.3 Metallic Tubing. (remaining text unchanged)

1208.5.3.5 Corrugated Stainless Steel Tubing. Corrugated stainless steel tubing shall be listed in accordance with CSA LC 1 and IAPMO IGC 201. {NFPA 54:5.5.3.6}.

TABLE 1701.1
REFERRED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 201-2018</td>
<td>Polyethylene Sleeved-Corrugated Stainless-Steel Tubing for use in Fuel Gas Piping Systems</td>
<td>Gas Tubing</td>
<td>1208.5.3.5</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO IGC 201 meets the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
The proposed standard covers polyethylene sleeved-corrugated stainless steel tubing (CSST) which is used in fuel gas systems. PE sleeved CSST have been tested and installed for over 10 years. Reference to the proper standards for this product will ensure public health and safety by clearly identifying products that are approved for fuel gas piping systems.

PUBLIC COMMENT 2

Code Year: 2024 UPC  Section #: 1208.6.4.5, Table 1701.1  Item #: 248

SUBMITTER: Robert N Torbin
OmegaFlex

RECOMMENDATION:
Revise text

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

1208.0 Gas Piping System Design, Materials, and Components.

1208.5 Acceptable Piping Materials and Joining Methods. (remaining text unchanged)

1208.5.3 Metallic Tubing. (remaining text unchanged)
Corrugated Stainless Steel Tubing. Corrugated stainless steel tubing shall be listed in accordance with CSA LC 1. [NFPA 54:5.5.3.6] Corrugated stainless steel tubing shall also comply with IAPMO IGC 201 when installed in accordance with Section 1210.1.6(2).

1210.1.6 Piping Underground Beneath Buildings. Where gas piping is installed underground beneath buildings, the piping shall be either of the following:

1. Encased in an approved conduit designed to withstand the imposed loads and installed in accordance with Section 1210.1.6.1 or Section 1210.1.6.2.
2. A piping/encasement system listed for installation beneath buildings. [NFPA 54:7.1.6]

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 201-2018e1</td>
<td>Polyethylene Sleeved-Corrugated Stainless-Steel Tubing for use in Fuel Gas Piping Systems</td>
<td>Gas Tubing</td>
<td>1208.6.4.5</td>
</tr>
</tbody>
</table>

Note: IAPMO IGC 201 meets the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
The proposed IAPMO standard covers polyethylene (PE) sleeved-corrugated stainless steel tubing (CSST) which is listed for use in fuel gas systems. PE sleeved CSST have been tested and listed by IAPMO R&T for over 10 years and is currently installed throughout the United States. Reference to the IAPMO standard for this product will ensure public health and safety by clearly identifying products that are approved for underground application assisting the installers, inspectors, and other end users of the code.
Proposals

Item #: 249
UPC 2024  Section: 1210.1.3.2

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Revise text

1210.0 Gas Piping Installation.
1210.1 Piping Underground. (remaining text unchanged)

1210.1.3 Protection Against Corrosion. (remaining text unchanged)

1210.1.3.2 Underground Piping. Underground piping shall comply with one or more of the following unless approved technical justification is provided to demonstrate that protection is unnecessary:
(1) The piping shall be made of corrosion-resistant material that is suitable for the environment in which it will be installed.
(2) Pipe shall have a factory-applied, electrically insulating coating. Fittings and joints between sections of coated pipe shall be coated in accordance with the coating manufacturer’s instructions.
(3) The piping shall have a cathodic protection system installed, and the system shall be maintained in accordance with Section 1210.1.3.3 or Section 1210.1.3.6. [NFPA 54:7.1.3.2]

1210.1.3.2 Underground Piping. Underground metallic gas piping shall be protected from corrosion by approved coatings or wrapping materials. Gas pipe protective coatings shall be in accordance with the following:
(1) Approved types, factory-applied, and conform to approved standards.
(2) Field wrapping shall provide equivalent protection and is restricted to those sections and fittings that are necessarily stripped for threading or welding.
(3) Risers shall be coated or wrapped to a point at least 6 inches (152 mm) above ground.

SUBSTANTIATION:
The above recommended language gives specific direction on how to protect underground gas piping. The current section is not clear as to what requirements are required.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The existing extracted language sufficiently states the intent of the section with regards to corrosion control of underground gas pipe.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 1210.1.3  Item #: 249
SUBMITTER: Douglas Kirk
Self

RECOMMENDATION:
Revise text

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

1210.0 Gas Piping Installation.
1210.1 Piping Underground. (remaining text unchanged)

1210.1.3 Protection Against Corrosion. (remaining text unchanged)

1210.1.3.2 Underground Piping. Underground piping shall comply with one or more of the following unless approved technical justification is provided to demonstrate that protection is unnecessary:
(1) The piping shall be made of corrosion-resistant material that is suitable for the environment in which it will be installed.
(2) Metallic gas pipe shall have a factory-applied, electrically insulating coating. Field wrapping shall provide equivalent protection and is restricted to those sections and fittings that are damaged during handling or necessarily stripped for threading or welding. Fittings and joints between sections of coated pipe shall be coated in accordance with the coating manufacturer’s instructions.
(3) The piping Underground ferrous gas piping shall be electrically isolated from the rest of the gas system by shall have a cathodic protection system installed, and the system shall be maintained in accordance with Section 1210.1.3.3 or Section 1210.1.3.6. {NFPA 54:7.1.3.2}

SUBSTANTIATION:
Much of Chapter 12 was replaced after 2000. The language that served so well for 70+ years was removed and replaced with language foreign to the users and enforcement agencies.

This amendment is a continuation of the effort to restore requirements that are definitive and comprehensive.

The below sections are from the 2000 edition of the UPC for your information.

1211.7 Underground ferrous gas piping shall be electrically isolated from the rest of the gas system with listed or approved isolation fittings installed a minimum of six (6) inches (152 mm) above grade.

1211.10 All gas pipe protective coatings shall be approved types, machine applied, and conform to recognized standards. Field wrapping shall provide equivalent protection and is restricted to those fittings and short sections where the factory wrap has been damaged or necessarily stripped for threading or welding (see Appendix I, IS-13). Zinc coatings (galvanizing) shall not be deemed adequate protection for gas piping below ground. Ferrous metals in exposed exterior locations shall be protected from corrosion in a manner satisfactory to the Administrative Authority. Protectively coated pipe shall be inspected and tested and any visible void, damage or imperfection to the pipe coating shall be repaired to comply with Section 313.0 (see Appendix I, IS-13).
Proposals

Item #: 252

UPC 2024  Section: Chapter 13

SUBMITTER: IAPMO Staff - Update Extracts
NFPA 99 Extract Update

RECOMMENDATION:
Revise text

205.0  – C –
Category 1. Activities, systems, or equipment whose failure is likely to cause major injury or death to patients, staff, or visitors. [NFPA 99:3.3.158.1-3.3.162.1]

Category 2. Activities, systems, or equipment whose failure is likely to cause minor injury to patients, staff, or visitors. [NFPA 99:3.3.158.2-3.3.162.2]

Category 3. Activities, systems, or equipment whose failure is not likely to cause injury to patients, staff, or visitors, but can cause discomfort. [NFPA 99:3.3.158.3-3.3.162.3]

Category 3 Vacuum System. A Category 3 vacuum distribution system that can be either a wet system designed to remove liquids, air-gas, or solids from the treated area; or a dry system designed to trap liquid and solids before the service inlet and to accommodate air-gas only through the service inlet. [NFPA 99:3.3.21-3.3.20]

Category 4. Activities, systems, or equipment whose failure would have no impact on patient care. [NFPA 99:3.3.158.4-3.3.162.4]

209.0  – G –
General Anesthesia and Levels of Sedation/Analgesia.

Deep Sedation/Analgesia. A drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully following repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway, and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained. [NFPA 99:3.3.66.2-3.3.68.2]

General Anesthesia. A drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired. [NFPA 99:3.3.66.1-3.3.68.1]

Minimal Sedation (Anxiolysis). A drug-induced state during which patients respond normally to verbal commands. Although cognitive function and coordination may be impaired, ventilatory and cardiovascular functions are unaffected. [NFPA 99:3.3.66.4-3.3.68.4]

Moderate Sedation/Analgesia (Conscious Sedation). A drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained. [NFPA 99:3.3.66.3-3.3.68.3]

210.0  – H –
Health Care Facility’s Governing Body. The person or persons who have the overall legal responsibility for the operation of a health care facility. [NFPA 99:3.3.72-3.3.74]

215.0  – M–
Medical Air. For the purposes of this code, medical air is air supplied from cylinders, bulk containers, or medical air compressors; or reconstituted from oxygen USP and oil-free, dry nitrogen NF. [NFPA 99:3.3.96-3.3.106]
Medical Gas. A patient medical gas or medical support gas. (See also Patient Medical Gas, and Medical Support Gas) [NFPA 99:3.3.104-3.3.108]

Manifold. A device for connecting the outlets of one or more gas cylinders to the central piping system for that specific gas. [NFPA 99:3.3.99-3.3.103]

Medical Gas System. An assembly of equipment and piping for the distribution of nonflammable medical gases such as oxygen, nitrous oxide, compressed air, carbon dioxide, and helium. [NFPA 99:3.3.106-3.3.109]

Medical Support Gas. Nitrogen or instrument air used for any medical support purpose (e.g., to remove excess moisture from instruments before further processing, or to operate medical-surgical tools, air-driven booms, pendants, or similar applications) and, if appropriate to the procedures, used in laboratories and are not respired as part of any treatment. Medical support gas falls under the general requirements for medical gases. [NFPA 99:3.3.107-3.3.111]

Medical-Surgical Vacuum. A method used to provide a source of drainage, aspiration, and suction in order to remove body fluids from patients. [NFPA 99:3.3.108-3.3.112]

Medical-Surgical Vacuum System. An assembly of central vacuum-producing equipment and a network of piping for patient suction in medical, medical-surgical, and waste anesthetic gas disposal (WAGD) applications. [NFPA 99:3.3.109-3.3.113]

216.0 – N –
Nitrogen, NF. Nitrogen complying as a minimum; with nitrogen NF. [NFPA 99:3.3.109-1-3.3.119.1]

218.0 – P –
Patient Care Space. Any space of a health care facility wherein patients are intended to be examined or treated. [NFPA 99:3.3.136-3.3.140]

Category 1 Space. Space in which failure of equipment or a system is likely to cause major injury or death of patients, staff, or visitors. [NFPA 99:3.3.136-1-3.3.140.1]

Category 2 Space. Space in which failure of equipment or a system is likely to cause minor injury to patients, staff, or visitors. [NFPA 99:3.3.136-2-3.3.140.2]

Category 3 Space. Space in which the failure of equipment or a system is not likely to cause injury to patients, staff, or visitors but can cause discomfort. [NFPA 99:3.3.136-3.3.140.3]

Category 4 Space. Space in which failure of equipment or a system is not likely to have a physical impact on patient care. [NFPA 99:3.3.136-4.3.3.140.4]

Patient Medical Gas. Piped gases such as oxygen, nitrous oxide, helium, carbon dioxide, and medical air that are used in the application of human respiration and the calibration of medical devices used for human respiration. [NFPA 99:3.3.142-3.3.144]

Proportioning System for Medical Air USP. A central supply that produces medical air (USP) reconstituted from oxygen USP and nitrogen NF by means of a mixer or blender. [NFPA 99:3.3.102.1-3.3.106.1]

221.0 – S –
Scavenging. Evacuation of exhaled mixtures of oxygen and nitrous oxide. [NFPA 99:3.3.159-3.3.163]

Standard Cubic Feet per Minute (SCFM). Volumetric flow rate of gas in units of standard cubic feet per minute. [NFPA 99:3.3.168-3.3.172]

Station Inlet. An inlet point in a piped medical/surgical vacuum distribution system at which the user makes connections and disconnections. [NFPA 99:3.3.169-3.3.173]

Station Outlet. An outlet point in a piped medical gas distribution system at which the user makes connections and disconnections. [NFPA 99:3.3.170-3.3.174]

225.0 – W –
Wet Procedure Locations. The area in a patient care space where a procedure is performed that is normally subject to wet conditions while patients are present, including standing fluids on the floor or drenching of the work area, either of which condition is intimate to the patient or staff. [NFPA 99:3.3.183-3.3.187]

1301.4 Where Required. Construction and equipment requirements shall be applied only to new construction and new equipment, except as modified in individual sections of this chapter. [NFPA 99:1.3.2]
1302.1 Risk Categories. Activities—All activities, as well as systems; or equipment that are new or altered, shall be designed to meet Category 1 through Category 4 requirements, as detailed in this chapter code. [NFPA 99:4.1]

1308.2 Pressure Relief Valves. All pressure relief valves shall meet the following requirements:
(1) They shall be of brass, bronze, or stainless steel construction.
(2) They shall be designed for the specific gas service.
(3) They shall have a relief pressure setting not higher than the maximum allowable working pressure (MAWP) of the component with the lowest working pressure rating in the portion of the system being protected.
(4) They shall be vented to the outside of the building, except that relief valves for compressed air systems having less than 3000 cubic feet (84 950 L) at STP shall be permitted to be diffused locally by means that will not restrict the flow.
(5) They shall have a vent discharge line that is not smaller than the size of the relief valve outlet or ¾ NPS (.20 mm), whichever is larger.
(6) Where two or more relief valves discharge into a common vent line, the internal cross-sectional area of the common line shall be not less than the aggregate cross-sectional area of all relief valve vent discharge lines served.
(7) They shall not discharge into locations creating potential hazards.
(8) They shall have the discharge terminal turned down and screened to prevent the entry of rain, snow, or vermin.
(9) They shall be designed in accordance with ASME B31.3. [NFPA 99:5.1.3.5.6.1]

1308.3 Pressure-Relief Valve Requirements. Central supply systems for positive pressure gases shall include one or more relief valves, all meeting the following requirements:
(1) They shall be located between each final line regulator and the source valve.
(2) They shall have a relief setting that is 50 percent above the normal system operating pressure, as indicated in Table 1303.1. [NFPA 99:5.1.3.5.6.3-5.1.3.5.6.4]

1309.1 Oxygen Requirements. Oxygen concentrator supply units for use with medical gas pipelines shall produce oxygen meeting the requirements of Oxygen 93 USP or Oxygen USP. [NFPA 99:5.1.3.5.11.1-5.1.3.9.1.1]

1309.2 Particulate Size. Output shall have less than or equal to 1.668 x 10⁻⁶ pounds per cubic yard (1 mg/m³) of permanent particulates sized 1 micron or larger at normal atmospheric pressure. [NFPA 99:5.1.3.5.11.2-5.1.3.9.1.2]

1309.3 Suitability. Materials of construction on the air side of the oxygen concentrator unit shall be suitable for the service as determined by the manufacturer. [NFPA 99:5.1.3.5.11.3-5.1.3.9.1.3]

1309.4 Compatible Materials. Materials of construction on the oxygen side of the oxygen concentrator unit shall comply with Section 1307.4. [NFPA 99:5.1.3.5.11.4-5.1.3.9.1.4]

1309.5 Oxygen Concentrator Components. The components that make up the oxygen concentrator unit shall be as follows:
(1) The manufacturer of the concentrator unit shall be permitted to use such components and arrangement of such components as needed to produce oxygen complying with Section 1309.1 in the quantity as required by the facility, except where otherwise specifically defined in this code.
(2) Air receivers and oxygen accumulators, where used, shall comply with Section VIII, "Unfired Pressure Vessels," of the ASME Boiler and Pressure Vessels Code and be provided with overpressure relief valves. [NFPA 99:5.1.3.5.11.5-5.1.3.9.1.5]

1309.6 Supply Air Quality. The supply air to the concentrator(s) shall be of a quality to ensure the oxygen concentrator unit can produce oxygen complying with Section 1309.1 and shall not be subject to normally anticipated contamination (e.g., vehicle or other exhausts, gas leakage, discharge from vents, flooding—and so forth). [NFPA 99:5.1.3.5.11.6-5.1.3.9.1.6]

1309.7 Electrical Components. The oxygen concentrator supply unit and any associated electrical equipment shall be provided, with, at a minimum, with the following electrical components:
(1) Either a disconnect switch for each major electrical component or a single disconnect that deactivates all electrical components in the concentrator unit.
(2) Motor starting devices with overload protection for any component with an electrical motor over 2 hp (1.5 kW). [NFPA 99:5.1.3.5.11.7-5.1.3.9.1.7]

1309.8 Vent Valve. A vent valve shall be provided as follows:
(1) Located on the source side of the concentrator outlet isolation valve to permit the operation of the oxygen concentrator unit for validation, calibration, and testing while the unit is isolated from the pipeline system.
(2) Sized to allow for at least 25 percent of the oxygen concentrator unit flow.
(3) Vented to a location compliant with Section 1309.8.1. [NFPA 99:5.1.3.5.11.8-5.1.3.9.1.8]

1309.9 Valved Sample Port. A DN8 (NPS 1/4) valved sample port shall be provided near the oxygen concentration monitor sensor connection for sampling of the gas from the oxygen concentrator unit. [NFPA 99:5.1.3.5.11.9-5.1.3.9.1.9]

1309.10 Suitable Filter. At least one 0.1 micron filter suitable for oxygen service shall be provided at the outlet of the oxygen concentrator supply unit. [NFPA 99:5.1.3.5.11.10-5.1.3.9.1.10]

1309.11 Check Valve. A check valve shall be provided at the outlet of the oxygen concentrator supply unit to prevent backflow into the oxygen concentrator supply unit and to allow service to the unit. [NFPA 99:5.1.3.5.11.11-5.1.3.9.1.11]
1309.12 Outlet Valve. An outlet valve shall be provided to isolate all components of the oxygen concentrator from the pipeline with the following characteristics:

1. The valve shall have both manual and automatic actuation with visual indication of open or closed.
2. The valve shall close automatically whenever the oxygen concentrator unit is not producing oxygen of a concentration equal to that in Section 1309.1.
3. Continuing operation of the oxygen concentrator supply unit through the vent mode shall be permitted with the isolating valve closed.
4. The isolating valve, when automatically closed due to low concentration, shall require manual reset to ensure the oxygen concentrator supply unit is examined prior to return to service.
5. Closing the isolating valve, whether automatically or manually, shall activate an alarm signal at the master alarms (see Section 1317.1.1) indicating that the oxygen concentrator supply unit is disconnected. [NFPA 99:5.1.3.5.11.12 5.1.3.9.1.12]

1309.13 Oxygen Concentration Monitor. The oxygen concentrator supply unit shall be provided with an oxygen concentration monitor with the following characteristics:

1. The monitor shall be capable of monitoring 99 percent oxygen concentration with 1 percent accuracy.
2. The monitor shall continuously display the oxygen concentration and shall activate local alarm and master alarms per NFPA 99 when a concentration lower than 91 percent is observed.
3. The monitor shall continuously display the oxygen concentration.
4. It shall be permitted to insert the monitor into the pipeline without a demand check. [NFPA 99:5.1.3.5.11.13]

1311.4 Location. Medical air intakes shall be located as follows:

1. The medical air intake shall be located a minimum of 25 feet (7620 mm) from ventilating system exhausts, fuel storage vents, combustion vents, plumbing vents, and vacuum and WAGD discharges, or areas that can collect vehicular exhausts or other noxious fumes.
2. The medical air intake shall be located a minimum of 20 feet (6096 mm) above ground level.
3. The medical air intake shall be located a minimum of 10 feet (3048 mm) from any door, window, or other opening in the building. [NFPA 99:5.1.3.6.3.11(B-D)]

1312.4 Vacuum Filtration. Central supply systems for vacuum other than liquid ring pumps shall be provided with inlet filtration with the following characteristics:

1. Filtration shall be at least duplex to allow one filter to be exchanged without impairing the vacuum system.
2. Filtration shall be located on the patient side of the vacuum producer.
3. Filters shall be efficient to 0.3 µ and 99.97 percent HEPA or better, per DOE-STD-3020.
4. Filtration shall be sized for 100 percent of the peak calculated demand while one filter or filter bundle is isolated.
5. It shall be permitted to group multiple filters into bundles to achieve the required capacities.
6. The system shall be provided with isolation valves on the source side of each filter or filter bundle and isolation valves on the patient side of each filter or filter bundle, permitting the filters to be isolated without shutting off flow to the central supply system.
7. A means shall be available to allow the user to observe any accumulations of liquids.
8. A vacuum relief petcock shall be provided to allow vacuum to be relieved in the filter canister during filter replacement.
9. Filter elements and canisters shall be permitted to be constructed of materials as deemed suitable by the manufacturer.
10. In normal operation, one filter or filter bundle shall be isolated from the system to be available for service should a blockage in the operating filter occur or rotation of the filters be desired after filter element exchange. [NFPA 99:5.1.3.7.4]

1313.4 Dips and Loops. The exhaust shall be free of dips and loops that might trap condensate or oil or provided with a drip leg and valved drain at the bottom of the low point. [NFPA 99:5.1.3.7.7.4 5.1.3.7.7.5]

1313.5 Multiple Pumps. Vacuum exhausts from multiple pumps shall be permitted to be joined together to one common exhaust where the following conditions are met:

1. The common exhaust is sized to minimize backpressure in accordance with the pump manufacturer’s recommendations.
2. Each pump can be isolated by manual or check valve, blind flange, or tube cap to prevent open exhaust piping when the pump(s) is removed for service from consequent flow of exhaust air into the room. [NFPA 99:5.1.3.7.7.6]

1314.5 Valve Types. New or replacement valves shall be permitted to be of any type as long as they meet the following conditions:

1. They have a minimum Cv factor in accordance with Table 1314.5(a) or Table 1314.5(b).
They use a quarter turn to off.

(3) They are constructed of materials suitable for the service.

(4) They are provided with copper tube extensions by the manufacturer for brazing or with corrugated medical tubing (CMT) fittings.

(5) They indicate to the operator if the valve is open or closed.

(6) They permit in-line serviceability.

(7) They are cleaned for oxygen service by the manufacturer if used for any positive-pressure service.

(8) They have threaded purge ports on the patient side and the source side.

(9) They have a minimum working pressure equal to or greater than the relief valve protecting the piping system on which the valve is installed for any positive-pressure service. [NFPA 99:5.1.4.1.6]

1314.10.1 Readily Accessible. A zone valve in each medical gas or vacuum line shall be provided for each Category 1 space and anesthetizing location for moderate sedation, deep sedation, or general anesthesia specific for the occupancy. These zone valves, and shall be located as follows:

(1) They are installed immediately outside the area controlled.

(2) They are readily installed where they are visible and accessible in an emergency at all times. [NFPA 99:5.1.4.6.2]

1317.1 Category 1. All master, area, and local alarm systems used for medical gas and vacuum systems shall include the following:

(1) Separate visual indicators for each condition monitored, except as permitted in Section 1317.1.2 for local alarms that are displayed on master alarm panels.

(2) Visual indicators that remain in alarm until the situation that has caused the alarm is resolved.

(3) Cancelable audible indication of each alarm condition that produces a sound with a minimum level of 80 decibels dBA at 3 feet (914 mm).

(4) Means to indicate a lamp or LED failure and audible failure.

(5) Visual and audible indication that the communication with an alarm-initiating device is disconnected.

(6) Labeling of each indicator, indicating the condition monitored.

(7) Labeling of each alarm panel for its area of surveillance.

(8) Reinitiation of the audible signal if another alarm condition occurs while the audible alarm is silenced.

(9) Power for master alarms, area alarms, sensors, and switches from the life safety branch of the essential electrical system as described in NFPA 99.

(10) Power for local alarms, dew point sensors, and carbon monoxide sensors permitted to be from the same essential electrical branch as is used to power the air compressor system.

(11) Where used for communications, wiring from switches or sensors that is supervised or protected as required by NFPA 70 for life safety and critical branches circuits in which protection is any of the following types:

(a) Conduit
(b) Free air
(c) Wire
(d) Cable tray
(e) Raceways

(12) Communication devices that do not use electrical wiring for signal transmission shall-initiates an alarm.

(13) Assurance by the responsible authority of the facility that the labeling of alarms, where room numbers or designations are used, is accurate and up-to-date.

(14) Provisions for automatic restart after a power loss of 10 seconds (e.g., during generator start-up) without giving false signals or requiring manual reset.

(15) Alarm switches/sensors installed so as to be removable and accessible for service and testing. [NFPA 99:5.1.9.1]

1320.2.1 Medical Vacuum Systems. Vacuum systems and WAGD systems fabricated from copper tubing shall be permitted to have branch connections made using mechanically formed, drilled, and extruded tee-branch connections that are formed in accordance with the tool manufacturer’s instructions. Such branch connections shall be joined by brazing, as described in Section 1321.0. [NFPA 99:5.1.10.3.3]

1321.7.2 Cut Ends. The cut ends of the tube shall be permitted to be rolled smooth or deburred with a sharp, clean deburring tool, taking care to prevent chips from entering the tube. [NFPA 99:5.1.10.4.2.3]

1321.8.7 On-Site Recleaning. The interior surfaces of tube ends, fittings, and other components that were cleaned for oxygen service by the manufacturer, but that became contaminated prior to being installed, shall be permitted to be recleaned on-site by the installer by thoroughly scrubbing the interior surfaces with a clean, hot water—alkaline solution, such as sodium carbonate or trisodium phosphate, using a solution of 1 pound (0.5 kg) of sodium carbonate or trisodium phosphate to 3 gallons (11 L) of potable water, and thoroughly rinsing them with clean, hot, potable water.
Other aqueous cleaning solutions shall be permitted to be used for on-site recleaning permitted in this section, provided that they are as recommended in accordance with the mandatory requirements of CGA G-4.1. [NFPA 99:5.1.10.4.3.10, 5.1.10.4.3.11]

1322.4 Axially Swaged Fittings. Axially swaged, elastic strain preload fittings providing metal-to-metal seals, having suitable for service at 300 psig (2070 kPa) and able to withstand a temperature of rating not less than 1000°F (538°C) and a pressure rating not less than 300 psi (2068 kPa), and that, when complete, are permanent and nonseparable, shall be permitted to be used to join copper or stainless steel tube. Axially swaged, elastic strain preload fittings shall be installed by qualified technicians in accordance with the manufacturer’s instructions. [NFPA 99:5.1.10.7.1, 5.1.10.7.2]

1323.13.1 Pipe Labeling. Piping shall be labeled by stenciling or adhesive markers that identify the patient medical gas, the medical support gas, or the vacuum system and include the following:
(1) Name of the gas or vacuum system or the chemical symbol per Table 1305.1.
(2) Gas or vacuum system color code per Table 1305.1.
(3) Where positive pressure gas piping systems operate at pressures other than the standard gauge pressure in Table 1305.1, the operating pressure in addition to the name of the gas. [NFPA 99:5.1.11.1.1]

1323.13.2 Pipe Pressure Labeling. Where positive pressure gas piping systems operate at pressures other than the standard gauge pressure in Table 1305.1, the operating pressure in addition to the name of the gas shall be labeled. [NFPA 99:5.1.11.1.2]

1323.13.3 Location of Pipe Labeling. Pipe labels shall be located as follows:
(1) At intervals of not more than 20 feet (6096 mm).
(2) At least once in or above every room.
(3) On both sides of walls or partitions penetrated by the piping.
(4) At least once in every story height traversed by risers. [NFPA 99:5.1.11.1.4]

1323.14 Identification of Shutoff Valves. Shutoff valves shall be identified with the following:
(1) Name or chemical symbol for the specific medical gas or vacuum system.
(2) Gas or vacuum system color code in accordance with Table 1305.1.
(3) Room or areas served.
(4) Caution to not close or open the valve except in emergency. [NFPA 99:5.1.11.2.1]

1323.14.2 Source Valves. Source valves shall be labeled in substance as follows:
SOURCE VALVE FOR THE (SOURCE NAME)
[NFPA 99:5.1.11.2.3-5.1.11.2.4]

1323.14.3 Main Line Valves. Main line valves shall be labeled in substance as follows:
MAIN LINE VALVE FOR THE (GAS/VACUUM NAME) SERVING (NAME OF THE BUILDING)
[NFPA 99:5.1.11.2.4-5.1.11.2.5]

1323.14.4 Riser Valves. The riser valve(s) shall be labeled in substance as follows:
RISER FOR THE (GAS/VACUUM NAME) SERVING (NAME OF THE AREA/BUILDING SERVED BY THE PARTICULAR RISER)
[NFPA 99:5.1.11.2.6]

1323.14.5 Service Valves. The service valve(s) shall be labeled in substance as follows:
SERVICE VALVE FOR THE (GAS/VACUUM NAME) SERVING (NAME OF THE AREA/BUILDING SERVED BY THE PARTICULAR VALVE)
[NFPA 99:5.1.11.2.6-5.1.11.2.7]

1323.14.6 Zone Valve Box. Zone valve box assemblies shall be labeled with the rooms, areas, or spaces that they control as follows:
ZONE VALVES FOR THE (GAS/VACUUM NAME) SERVING (NAME OF ROOMS OR SPACES SERVED BY THE PARTICULAR VALVE)
Labeling shall either be visible from outside the zone valve box assembly through the cover or be replicated on the outside, but not affixed to the removable cover. [NFPA 99:5.1.11.2.7-5.1.11.2.8]

1323.15 Identification. Station outlets and inlets shall be identified as to the name or chemical symbol for the specific medical gas or vacuum provided and shall include the following:
1. Name of the gas or vacuum system or the chemical symbol in accordance with Table 1305.1
2. Gas or vacuum system color code in accordance with Table 1305.1

In sleep labs, where the outlet is downstream of a flow control device, the station outlet identification shall include a warning not to use the outlet for ventilating patients.

Where medical gas systems operate at pressures other than the standard gauge pressure of 50 psi to 55 psi (345 kPa to 380 kPa) or a gauge pressure of 160 psi to 185 psi (1103 kPa to 1275 kPa) for nitrogen, the station outlet identification shall include the nonstandard operating pressure in addition to the name of the gas. [NFPA 99:5.1.11.3.1 – 5.1.11.3.2]

1324.5.4.1 Time Frame for Testing. Tests shall be conducted after the final installation of station outlet valve bodies, faceplates, and all other distribution system components (e.g., pressure alarm devices, pressure indicators, line pressure relief valves, manufactured assemblies, hose). [NFPA 99:5.1.12.2.6.1]

1324.5.4.5 Conclusion of Test. The leakage over the 24-hour test shall not exceed 0.5 percent of the starting pressure [e.g., 0.3 psi (2 kPa) starting at 60 psig (414 kPa), 0.125 inch (3.2 mm) HgV starting at 25 inches (635 mm) HgV] except that attributed to specific changes of in ambient temperature. [NFPA 99:5.1.12.2.7.5]

1324.5.5.2 Length of Testing. The piping systems shall be subjected to a 24-hour standing vacuum test. [NFPA 99:5.1.12.2.7.2]

1324.5.5.5 Conclusion of Test. At the conclusion of the test, there shall be no change in the vacuum other than. The leakage over the 24-hour test shall not exceed 0.5 percent of the starting pressure [e.g., 0.125 inch (0.3 mm) HgV starting at 25 inches (635 mm) HgV] except that attributed to specific changes of in ambient temperature. [NFPA 99:5.1.12.2.7.5]

1324.5.5.6 Proof of Testing. The 24-hour standing pressure test of the vacuum system shall be witnessed by the Authority Having Jurisdiction or its designee. A form indicating that this test has been performed and witnessed shall be provided to the verifier at the start of the tests required in Section 1324.5.7 through Section 1324.5.11. [NFPA 99:5.1.12.2.7.6]

1325.1 General. Category 2 piped gas or piped vacuum system requirements shall be permitted when all of the following criteria are met:
1. Only moderate sedation; (as defined in Chapter 2), minimal sedation; (as defined in Chapter 2); or no sedation is performed. Deep sedation and general anesthesia shall not be permitted.
2. The loss of the piped gas or piped vacuum systems is likely to cause minor injury to patients, staff, or visitors.
3. The facility piped gas or piped vacuum systems are intended for Category 2 patient care space as defined in Chapter 2. [NFPA 99:5.2.1.2]

1325.10 Warning Systems (Category 2). Warning systems associated with Category 2 systems shall provide the master, area, and local alarm functions of a Category 1 system as required in Section 1317.0, except as follows:
1. Warning systems shall be permitted to be a single alarm panel.
2. The alarm panel shall be located in an area of continuous surveillance while the facility is in operation.
3. Pressure and vacuum switches/sensors shall be mounted at the source equipment with a pressure indicator at the master alarm panel. [NFPA 99:5.2.9]

1325.11 Category 2 Distribution. Level Category 2 systems shall comply with Section 1318.0 through Section 1323.12. [NFPA 99:5.2.10]

1325.13 Performance Criteria and Testing — Category 2 (Gas, Medical–Surgical and Vacuum, and WAGD). Category 2 systems shall comply with Section 1324.0. [NFPA 99:5.2.12]

1326.1 General. Category 3 piped gas and vacuum systems shall be permitted when all of the following criteria are met:
1. Only moderate sedation; minimal sedation, as defined in Chapter 2; or no sedation is performed. Deep sedation, moderate sedation, and general anesthesia are not performed.
2. The loss of the piped gas and vacuum systems is not likely to cause injury to patients, staff, or visitors, but can cause discomfort.
3. The facility piped gas and vacuum systems are intended for Category 3 or Category 4 patient care rooms as defined in Chapter 2. [NFPA 99:5.3.1.2]
1326.3 Medical Air Supply Systems. Category 3 central supply systems shall comply with Section 1310.0 through Section 1311.6, except as follows:

(1) Medical air compressors, dryers, after coolers, filters, and regulators shall be permitted to be simplex.
(2) The facility staff shall develop their emergency plan to deal with the loss of medical air.
(3) Gas cylinder or cryogenic liquid container headers in accordance with NFPA 99
(4) Oxygen concentrator supply units in accordance with NFPA 99
(5) Cylinder manifolds for gas cylinders in accordance with NFPA 99
(6) Manifolds for cryogenic liquid containers in accordance with NFPA 99
(7) Cryogenic fluid central supply systems in accordance with NFPA 99
(8) Medical air compressor systems in accordance with NFPA 99
(9) Waste anesthetic gas disposal systems (WAGDs) in accordance with NFPA 99
(10) Instrument air compressor systems in accordance with NFPA 99 (NFPA 99:5.3.3.5)

1326.4 Oxygen Central Supply Systems Using Concentrators. Category 3 oxygen supply systems using concentrators shall be permitted to consist of two sources, one of which shall be a cylinder header with sufficient cylinder connections for one average day’s supply. [NFPA 99:5.3.3.6]

1326.5 Medical–Surgical Vacuum Systems. Category 3 systems shall comply with Section 1307.3 through Section 1312.0 and Section 1313.5, except as follows:

(1) Medical–surgical vacuum systems shall be permitted to be simplex.
(2) The facility staff shall develop their emergency plan to deal with the loss of medical–surgical vacuum.
(3) Emergency electrical service shall conform to the requirements of Section 6.6 of NFPA 99 and NFPA 70. [NFPA 99:5.3.3.7]

1326.6 Valves. Category 3 systems shall comply with Section 1314.0. [NFPA 99:5.3.4]

1326.7 Station Outlets and Inlets. Category 3 systems shall comply with Section 1315.0. [NFPA 99:5.3.5]

1326.8 Pressure and Vacuum Indicators. Category 3 systems shall comply with Section 1316.2. [NFPA 99:5.3.8]

1326.9 Warning Systems. Warning systems associated with Category 3 systems shall provide the master, area, and local alarm functions of a Category 1 system as required in Section 1317.0, except as follows:

(1) Warning systems shall be permitted to be a single alarm panel (i.e., a combination master/area alarm panel).
(2) The alarm panel shall be located in an area of continuous surveillance while the facility is in operation.
(3) Pressure and vacuum switches/sensors shall be mounted at the source equipment with a pressure indicator at the master alarm panel.
(4) Electrical power for warning systems shall be in accordance with Section 6.6 of NFPA 99 for Category 3 and Category 4 spaces. [NFPA 99:5.3.9]

1326.10 Distribution. Category 3 systems shall comply with Section 1318.0 through Section 1323.12. [NFPA 99:5.3.10]

1326.11 Labeling and Identification. Category 3 systems shall comply with Section 1323.13 through Section 1323.15. [NFPA 99:5.3.11]

1327.2 Emergency Shutoff Valves (Oxygen and Nitrous Oxide). Emergency shutoff valves shall be provided in accordance with the following:

(1) Where a central medical gas supply is remote from a single treatment facility, the main supply line shall be provided with an emergency shutoff valve located in the single treatment facility so as to be accessible from all use-point locations in an emergency.
(2) Where a central medical gas supply system supplies two treatment facilities, each facility shall be provided with an emergency shutoff valve located in that treatment facility so as to be accessible from all use-point locations in an emergency.
(3) Emergency shutoff valves shall be labeled to indicate the gas controlled by the shutoff valve and shall shut off only the gas to the treatment facility that they serve.
(4) A remotely activated shutoff valve at a gas supply manifold shall not be used for emergency shutoff. For clinical purposes, such a remote valve actuator shall not fail-close in the event of loss of electric power. Where remote actuators are the type that fail-open, it shall be mandatory that cylinder shutoff valves be closed whenever the system is not in use. [NFPA 99:15.4.2.6.1 – 15.4.2.6.4.2]
### TABLE 1305.1
STANDARD DESIGNATION COLORS AND OPERATING PRESSURES FOR GAS AND VACUUM SYSTEMS
[NFPA 99: TABLE 5.1.11]

<table>
<thead>
<tr>
<th>GAS SERVICE</th>
<th>ABBREVIATED NAME</th>
<th>COLORS (BACKGROUND/ TEXT)</th>
<th>STANDARD GAUGE PRESSURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical air</td>
<td>Med Air</td>
<td>Yellow/black</td>
<td>50–55 psi</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>CO2</td>
<td>Gray/black or gray/white</td>
<td>50–55 psi</td>
</tr>
<tr>
<td>Helium</td>
<td>He</td>
<td>Brown/white</td>
<td>50–55 psi</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>N2</td>
<td>Black/white</td>
<td>50–55 psi</td>
</tr>
<tr>
<td>Nitrous oxide</td>
<td>N2O</td>
<td>Blue/white</td>
<td>400–55–185 psi</td>
</tr>
<tr>
<td>Oxygen</td>
<td>O2</td>
<td>Green/white or white/green</td>
<td>50–55 psi</td>
</tr>
<tr>
<td>Oxygen/carbon dioxide mixtures</td>
<td>O2/CO2 n% (n = % of CO2)</td>
<td>Green/white</td>
<td>50–55 psi</td>
</tr>
<tr>
<td>Medical–surgical vacuum</td>
<td>Med Vac</td>
<td>White/black</td>
<td>15 inch to 30 inch HgV</td>
</tr>
<tr>
<td>Waste anesthetic gas disposal</td>
<td>WAGD</td>
<td>Violet/white</td>
<td>Varies with system type</td>
</tr>
<tr>
<td>Medical-surgical vacuum/ WAGD combination</td>
<td>Med-surg/ WAGD</td>
<td>White/black and violet/white</td>
<td>15 inch to 30 inch HgV</td>
</tr>
<tr>
<td>Other mixtures</td>
<td>Gas A% / Gas B%</td>
<td>Colors as above; major gas for back- ground/minor gas for text</td>
<td>None</td>
</tr>
<tr>
<td>Nonmedical air (Category 3 gas-powered device) and dental air</td>
<td>—</td>
<td>Yellow-and-white Yellow and white diagonal stripe/black</td>
<td>None</td>
</tr>
<tr>
<td>Nonmedical vacuum and Category 3 dental vacuum</td>
<td>—</td>
<td>White-and-black White and black diagonal stripe/black boxed</td>
<td>None</td>
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<tr>
<td>Laboratory air</td>
<td>—</td>
<td>Yellow-and-white checker-board Yellow and white checkerboard/black</td>
<td>None</td>
</tr>
<tr>
<td>Laboratory vacuum</td>
<td>—</td>
<td>White-and-black White and black checkerboard/black boxed</td>
<td>None</td>
</tr>
<tr>
<td>Instrument air</td>
<td>—</td>
<td>Red/white</td>
<td>460–50–185 psi</td>
</tr>
</tbody>
</table>

For SI units: 1 pound-force per square inch = 6.8947 kPa, 1 inch of mercury vacuum (HgV) = 3.386 kPa

### TABLE 1314.5(a)
POSITIVE PRESSURE GASES
[NFPA 99: Table 5.1.4.1.6(a)]

<table>
<thead>
<tr>
<th>VALVE SIZE (inch)</th>
<th>MINIMUM Cv (full open)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>17</td>
</tr>
<tr>
<td>3/4</td>
<td>31</td>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
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<tr>
<td>2 1/2</td>
<td>390</td>
</tr>
<tr>
<td>3</td>
<td>912</td>
</tr>
<tr>
<td>4</td>
<td>1837</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25.4 mm
### TABLE 1314.5(b)
**VACUUM AND WAGD**
[NFPA 99:Table 5.1.4.1.6(b)]

<table>
<thead>
<tr>
<th>VALVE SIZE (inch)</th>
<th>MINIMUM Cv (full open)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>17</td>
</tr>
<tr>
<td>3/4</td>
<td>31</td>
</tr>
<tr>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td>1 1/4</td>
<td>110</td>
</tr>
<tr>
<td>1 1/2</td>
<td>169</td>
</tr>
<tr>
<td>2</td>
<td>357</td>
</tr>
<tr>
<td>2 1/2</td>
<td>196</td>
</tr>
<tr>
<td>3</td>
<td>302</td>
</tr>
<tr>
<td>4</td>
<td>600</td>
</tr>
<tr>
<td>5</td>
<td>1022</td>
</tr>
<tr>
<td>6</td>
<td>1579</td>
</tr>
<tr>
<td>8</td>
<td>3136</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25.4 mm

### TABLE 1323.4.4
**MAXIMUM PIPE SUPPORT SPACING**
[NFPA 99: TABLE 5.1.10.11.4.6]

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>HANGER SPACING (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN8 (NPS 1/4) (3/8 of an inch O.D.)</td>
<td>5</td>
</tr>
<tr>
<td>DN10 (NPS 3/8) (1/2 of an inch O.D.)</td>
<td>6</td>
</tr>
<tr>
<td>DN15 (NPS 1/2) (5/8 of an inch O.D.)</td>
<td>6</td>
</tr>
<tr>
<td>DN20 (NPS 3/4) (7/8 of an inch O.D.)</td>
<td>7</td>
</tr>
<tr>
<td>DN25 (NPS 1) (11/8 of an inch O.D.)</td>
<td>8</td>
</tr>
<tr>
<td>DN32 (NPS 11/4) (13/8 of an inch O.D.)</td>
<td>9</td>
</tr>
<tr>
<td>DN40 and larger (NPS 11/2) (15/8 of an inch O.D.)</td>
<td>10</td>
</tr>
</tbody>
</table>

Vertical risers, all sizes, every floor, but not to exceed: 15

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm
### TABLE 1327.5
MAXIMUM COPPER TUBE SUPPORT SPACING
[NFPA 99: TABLE 15.4.5.6.5]

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>HANGER SPACING (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN8 (NPS 1/4) (3/8 of an inch O.D.)</td>
<td>5</td>
</tr>
<tr>
<td>DN10 (NPS 3/8) (1/2 of an inch O.D.)</td>
<td>6</td>
</tr>
<tr>
<td>DN15 (NPS 1/2) (5/8 of an inch O.D.)</td>
<td>6</td>
</tr>
<tr>
<td>DN20 (NPS 3/4) (7/8 of an inch O.D.)</td>
<td>7</td>
</tr>
<tr>
<td>DN25 (NPS 1) (11/8 of an inch O.D.)</td>
<td>8</td>
</tr>
<tr>
<td>DN32 (NPS 11/4) (13/8 of an inch O.D.)</td>
<td>9</td>
</tr>
<tr>
<td>DN40 and larger (NPS 11/2) (15/8 of an inch O.D.)</td>
<td>10</td>
</tr>
</tbody>
</table>

Vertical risers, all sizes, every floor, but not to exceed: 15

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm

### TABLE 1327.6
MAXIMUM PLASTIC PIPE SUPPORT SPACING
[NFPA 99: TABLE 15.4.5.6.6]

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>HANGER SPACING (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN15 (NPS 1/2) (5/8 of an inch O.D.)</td>
<td>4</td>
</tr>
<tr>
<td>DN20 (NPS 3/4) (7/8 of an inch O.D.)</td>
<td>4</td>
</tr>
<tr>
<td>DN25 (NPS 1) (11/8 of an inch O.D.)</td>
<td>4.33</td>
</tr>
<tr>
<td>DN32 (NPS 11/4) (13/8 of an inch O.D.)</td>
<td>4.33</td>
</tr>
<tr>
<td>DN40 (NPS 11/8) (15/8 of an inch O.D.)</td>
<td>4.66</td>
</tr>
<tr>
<td>DN50 (NPS 2) (23/8 of an inch O.D.)</td>
<td>4.66</td>
</tr>
<tr>
<td>DN65 and larger (NPS 21/2) (27/8 of an inch O.D.)</td>
<td>5</td>
</tr>
</tbody>
</table>

Vertical risers, all sizes, every floor, but not to exceed: 10

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm

**SUBSTANTIATION:**
The above sections have been revised to correlate with NFPA 99-2021 (latest version) in accordance with IAPMO's Regulations Governing Committee Projects (Extract Guidelines).

**COMMITTEE ACTION:** ACCEPT AS SUBMITTED

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 1301.4, 1302.1  Item #: 252
SUBMITTER: Phillip H Ribbs  PHR Consultants  Comment #: 1

RECOMMENDATION:
Revise text

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

1301.0 General Requirements.

1301.4 Where Required. Construction and equipment requirements shall be applied only to new construction and new equipment, except as modified in individual sections of this chapters. [[NFPA 99:1.3.2]]

1302.0 Design Requirements.
1302.1 Risk Categories. All activities, as well as systems or equipment that are new or altered, shall be designed to meet Category 1 through Category 4 requirements, as detailed in this chapter. [[NFPA 99:4.1]]

SUBSTANTIATION:
The language in Sections 1301.4 & 1302.1 should only reference this “chapter” as these provisions are specific to Chapter 13 regarding medical gas systems.
Proposals

Item #: 255

UPC 2024 Section: 1501.3 - 1504.6.1

SUBMITTER: Jim Kendzel
    American Supply Association
    Rep. Chairman of the Alternate Water Sources Task Group

RECOMMENDATION:
Revise text

1501.3 Permit. It shall be unlawful for a person to construct, install, alter, or cause to be constructed, installed, or altered an alternate 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 meeting the requirements of Section 1501.3.1. A written notification shall be provided to the Authority Having Jurisdiction in accordance with Section 1501.3.1.

1501.3.1 Clothes Washer System. A clothes washer system in compliance with all of the following is exempt from the construction permit specified in Section 1501.3 and shall be permitted to 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.
1501.6 Operation and Maintenance Manual. An operation and maintenance manual for gray water and on-site treated water systems required to have a permit in accordance with Section 1501.3 shall be supplied to the building owner by the system designer. The operation and maintenance manual shall include the following:
(1) Detailed diagram of the entire system and the location of system components.
(2) Instructions for operating and maintaining the system.
(3) Details on maintaining the required water quality for onsite nonpotable water systems.
(4) Details on deactivating the system for maintenance, repair, or other purposes.
(5) Applicable testing, inspection, and maintenance frequencies in accordance with Table 1501.5.
(6) A method of contacting the manufacturer(s).
(7) Directions to the owner or occupant that the manual shall remain with the building throughout the life of the structure.

1503.0 Gray Water Systems.
1503.1 General. The provisions of this section shall apply to the construction, alteration, and repair of gray water systems.
1503.2 Gray Water Collection Piping. New single-family dwellings shall have a separate waste piping system for all gray water fixtures in accordance with this code. The separate piping system shall be piped to outside the building and terminate into an approved gray water diverter valve in accordance with Section 1503.2.2 before connecting to the waste system from non-gray water fixtures.
Exception: Where ground conditions do not provide percolation or where prohibited by this code.
1503.2.1 Diverter. The diverter valve 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.
1503.2.2 Access. The diverter and sewer connection shall be readily accessible for connection, inspection, maintenance, and servicing.
1503.2.3 Regulatory. Gray water reuse and irrigation system components shall meet local, and state code and regulatory requirements.

1503.2 System Requirements. Gray water shall be permitted to be diverted away from a sewer or private sewage disposal system of single family and multifamily dwellings, and discharge to a subsurface irrigation or subsoil irrigation system, or to a mulch basin, or disposal field. The gray water shall be permitted to irrigate root crops or food crops intended for human consumption that comes in contact with soil.
1503.2.1 Surge Capacity. Gray water systems shall be designed to have the capacity to accommodate peak flow rates and distribute the total amount of estimated gray water on a daily basis to a subsurface irrigation field, subsoil irrigation field, or mulch basin without surfacing, ponding, or runoff. A surge tank is required for systems that are unable to accommodate peak flow rates and distribute the total amount of gray water by gravity drainage. The water discharge for gray water systems shall be determined in accordance with Section 1503.8.1 or Section 1503.8.2. Systems that produce more gray water than needed by the landscape shall discharge excess water into the sewer or private sewage disposal system.
1503.2.2 Diversion. The gray water system shall connect to the sanitary drainage system downstream of fixture traps and vent connections through a gray water diverter valve(s) approved by the Authority Having Jurisdiction. The gray water diverter valve shall comply with IAPMO PS-59 and be installed in an accessible location and clearly indicate the direction of flow.
Exception: A clothes washer system in compliance with Section 1501.3.1.
### TABLE 1503.4
**LOCATION OF GRAY WATER SYSTEM**

<table>
<thead>
<tr>
<th>MINIMUM HORIZONTAL DISTANCE IN CLEAR REQUIRED FROM:</th>
<th>SURGE TANK (feet)</th>
<th>SUBSURFACE AND SUBSOIL IRRIGATION FIELD AND MULCH BED (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building structures(^1)</td>
<td>52, 9</td>
<td>23, 8</td>
</tr>
<tr>
<td>Property line adjoining private property</td>
<td>5</td>
<td>58</td>
</tr>
<tr>
<td>Water supply wells(^4)</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>Streams and lakes(^4)</td>
<td>50</td>
<td>505</td>
</tr>
<tr>
<td>Sewage pits or cesspools</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Sewage disposal field(^10)</td>
<td>5</td>
<td>46</td>
</tr>
<tr>
<td>Septic tank</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>On-site domestic water service line</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Pressurized public water main</td>
<td>10</td>
<td>10(^7)</td>
</tr>
</tbody>
</table>

For SI units: 1 foot = 304.8 mm  

**Note:** Where irrigation or disposal fields are installed in sloping ground, the minimum horizontal distance between any part of the distribution system and the ground surface shall be 15 feet (4572 mm).

\(^1\) Including porches and steps, whether covered or uncovered, breezeways, roofed carports, roofed patios, carports, covered walks, covered drive-ways, and similar structures or appurtenances.

\(^2\) The distance shall be permitted to be reduced to 0 feet for aboveground tanks when first approved by the Authority Having Jurisdiction.

\(^3\) Reference to a 45 degree (0.79 rad) angle from foundation.

\(^4\) Where special hazards are involved, the distance required shall be increased as directed by the Authority Having Jurisdiction.

\(^5\) These minimum clear horizontal distances shall also apply between the irrigation or disposal field and the ocean mean high high tide line.

\(^6\) Add 2 feet (610 mm) for each additional foot of depth in excess of 1 foot (305 mm) below the bottom of the drain line.

\(^7\) For parallel construction or for crossings, approval by the Authority Having Jurisdiction shall be required.

\(^8\) The distance shall be permitted to be reduced to 11/2 feet (457 mm) for drip and mulch basin irrigation systems.

\(^9\) The distance shall be permitted to be reduced to 0 feet for surge tanks of 75 gallons (284 L) or less.

\(^10\) Where irrigation or disposal fields are installed in the sloping ground, the minimum horizontal distance between a part of the distribution system and the ground surface shall be 15 feet (4572 mm).

### 1503.8.1 Single Family Dwellings and Multi-Family Dwellings

The gray water discharge for single family and multi-family dwellings shall be calculated by water use records, calculations of local daily per person interior water use, or the following procedure:

1. The number of occupants of each dwelling unit shall be calculated as follows:

<table>
<thead>
<tr>
<th>First bedroom</th>
<th>2 occupants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each additional bedroom</td>
<td>1 occupant</td>
</tr>
</tbody>
</table>

2. The estimated gray water flows of each occupant shall be calculated as follows:

   | Showers, bathtubs, and lavatories | 25 13 gallons (95 50 L) per day/occupant |
   | Lavatories                       | 4 gallons (15 L) per day/occupant         |
   | Laundry                          | 45 10 gallons (67 38 L) per day/occupant  |

(3) (remaining text unchanged)
1503.9.4 Subsurface Irrigation Field and Mulch Basin Supply Line Materials. Materials for gray water piping outside the building for non-pressure gravity systems shall be ABS, polyethylene, or PVC or other approved DWV pipe. Pressure systems shall be pressure rated polyethylene or PVC or other approved pressure rated pipe. Drip feeder lines shall be PVC or polyethylene tubing.

<table>
<thead>
<tr>
<th>TABLE 1504.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESIGN OF SIX-TYPICAL SOILS ABSORPTION CAPACITY</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TYPE OF SOIL</th>
<th>MINIMUM SQUARE FEET OF IRRIGATION AREA PER 100 GALLONS OF ESTIMATED GRAY WATER-DISCHARGE PER DAY</th>
<th>MAXIMUM ABSORPTION CAPACITY IN GALLONS PER SQUARE FOOT OF IRRIGATION/LEACHING AREA FOR A 24-HOUR PERIOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse-sand or gravel</td>
<td>20</td>
<td>5.0</td>
</tr>
<tr>
<td>Fine-sand</td>
<td>25</td>
<td>4.0</td>
</tr>
<tr>
<td>Sandy-loam</td>
<td>40</td>
<td>2.5</td>
</tr>
<tr>
<td>Sandy-clay</td>
<td>60</td>
<td>1.7</td>
</tr>
<tr>
<td>Clay with considerable sand or gravel</td>
<td>90</td>
<td>1.4</td>
</tr>
<tr>
<td>Clay with small amounts of sand or gravel</td>
<td>120</td>
<td>0.8</td>
</tr>
</tbody>
</table>

SOIL CLASS AND TEXTURES

<table>
<thead>
<tr>
<th>MAXIMUM ABSORPTION CAPACITY IN GALLONS PER SQUARE FOOT OF IRRIGATION/LEACHING AREA FOR A 24-HOUR PERIOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandy Loam (Group A) (Textures: sand, loamy sand, sandy loam)</td>
</tr>
<tr>
<td>Loam (Group B) (Textures: loam, silt loam)</td>
</tr>
<tr>
<td>Sandy Clay Loam (Group C) (Textures: Sandy clay loam)</td>
</tr>
<tr>
<td>Clay Loam (Group D) (Textures: clay loam, silty clay loam, sandy clay, silty clay, clay)</td>
</tr>
</tbody>
</table>

For SI units: 1 square foot = 0.0929 m², 1 gallon per day = 0.000043 L/s

1504.5.4 Emitter Size. Emitters shall be installed in accordance with the manufacturer’s installation instructions. Emitters shall have a flow path of not less than 1200 microns (µ) (1200 µm) and shall not have a coefficient of manufacturing variation (Cv) exceeding 7 percent. Irrigation system design shall be such that emitter flow variation shall not exceed 10 percent.

1504.5.7 Maximum Pressure. Where pressure at the discharge side of the pump exceeds 20 pounds-force per square inch (psi) (138 kPa), a pressure-reducing valve able to maintain downstream pressure no greater than the maximum operating pressure of the installed tubing, emitters, or other components not exceeding 20 psi (138 kPa) shall be installed downstream from the pump and before an emission device.

1504.6 Mulch Basin Design and Construction. A mulch basin shall comply with Section 1504.6.1 through Section 1504.6.34.

1504.6.1 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)
The proposed changes to Chapter 15 are updates to harmonize to the latest edition of the WeStand.

The updates include provisions for clothes washer only systems. 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 many incentive programs across the state for the clothes washer graywater system due to its permit-exempt status.

For Section 1501.6(7), this addition should be added so the system owner knows they must pass on the Operation and Maintenance (O&M) manual to future owners.

For Section 1503.2, 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.

These provisions give guidance to piping these gray water systems.

For Table 1504.2: The existing Table 1504.2 “Design of Six Typical Soils” does not appear to come from a referenced source and the names of the soils are not typical soils. If someone were to send their soil into a laboratory for testing, or perform an on-site test using standard soil texture identification methods (jar test or soil ribbon test) the soil names they would get would most likely not match this chart. We have not been able to find the original source for the information in this table. The information doesn't appear to come from septic design or irrigation system design: it appears the original creators of this table used some unknown infiltration rate and applied an unknown factor to come up with the provided coefficients for infiltration graywater into various types of soil. This new proposed table uses steady state infiltration rates from the Minnesota Stormwater Manual 2013. This manual compiled infiltration rates and recommendations based on a review of 30 guidance manuals and other stormwater references. Other agencies, like the San Francisco Public Utilities Commission, use the same table in their stormwater system sizing manuals. The table uses steady state infiltration rates and is based on the assumption that the soil is very deeply wetted below (or at field capacity), which builds in a safety factor into the numbers. (Graywater systems are typically shut off during the rainy season so the soil would not be at field capacity during irrigation time.) By adopting this new table, the UPC would be using a soil infiltration table that is aligned with actual, published references that are used by stormwater, civil engineers, and landscape professionals. The proposed table includes both hydrologic groups, which a person could look up the property's hydrologic group on a GIS map or NRCS map, as well as soil textures which an on-site soil test could verify. The proposed table is more conservative for clay soil types, and so would have less potential for overloading slower draining soils than the existing table. The proposed table has higher infiltration rates for sandy and loam soils, which are soils that are verified by studies (see references for Stormwater Manual) to infiltrate much much more water than the current table permits. To create the new table we converted the units provided in the referenced table from inches/hour to gallons/day as shown in the reference material. This is the source for the steady state infiltration rates: Minnesota Stormwater Manual 2013 -thirty guidance manuals and many other stormwater references were reviewed to compile recommended infiltration rates. All of these sources use the following studies as the basis for their recommended infiltration rates: (1) Rawls, Brakensiek and Saxton (1982); (2) Rawls, Gimenez and Grossman (1998); (3) Bouwer and Rice (1984); and (4) Urban Hydrology for Small Watersheds (NRCS). SWWD, 2005, provides field documented data that supports the proposed infiltration rates. (view reference list here https://stormwater.pca.state.mn.us/index.php?title=References) The Full Minnesota Stormwater Manual is available on-line here: https://stormwater.pca.state.mn.us/index.php?title=Main_Page

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT: The proposed change contains unenforceable language such as "minimize contact with humans and domestic pets." The provisions are unclear. Additionally, section 1501.3 is confusing as it requires a permit then exempts it.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 22  NEGATIVE: 3  NOT RETURNED: 1  Daniels

EXPLANATION OF NEGATIVE:

BALLANCO: The proposed change would harmonize the code with WE-Stand. This change was properly substantiated and should have been accepted as submitted.

GORSUCH: I agree with the code change as it would allow the option to those that are concerned with sustainability. Perhaps this can go into an appendix.

WHITE: The proposed language adds sustainability options and, therefore, should be allowed in the code.
**PUBLIC COMMENT 1**

**Code Year:** 2024 UPC  **Section #:** 1501.3 - 1504.6.1, Table 1503.4, Table 1504.2  **Item #:** 255

**SUBMITTER:** Jim Kendzel  
American Supply Association  
Rep. Chair, Alternate Water Sources Task Group

**RECOMMENDATION:**  
Revise text  
Request to accept the code change proposal as submitted by this public comment.

**SUBSTANTIATION:**  
The proposed changes to Chapter 15 are updates to harmonize to the latest edition of the WeStand. The updates include provisions for clothes washer only systems. 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 many incentive programs across the state for the clothes washer graywater system due to its permit-exempt status.

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For Table 1504.2: The existing Table 1504.2 "Design of Six Typical Soils" does not appear to come from a referenced source and the names of the soils are not typical soils. If someone were to send their soil into a laboratory for testing, or perform an on-site test using standard soil texture identification methods (jar test or soil ribbon test) the soil names they would get would most likely not match this chart. We have not been able to find the original source for the information in this table. The information doesn't appear to come from septic design or irrigation system design: it appears the original creators of this table used some unknown infiltration rate and applied an unknown factor to come up with the provided coefficients for infiltration graywater into various types of soil. This new proposed table uses steady state infiltration rates from the Minnesota Stormwater Manual 2013. This manual compiled infiltration rates and recommendations based on a review of 30 guidance manuals and other stormwater references. Other agencies, like the San Francisco Public Utilities Commission, use the same table in their stormwater system sizing manuals. The table uses steady state infiltration rates and is based on the assumption that the soil is very deeply wetted below (or at field capacity), which builds in a safety factor into the numbers. (Graywater systems are typically shut off during the rainy season so the soil would not be at field capacity during irrigation time.) By adopting this new table, the UPC would be using a soil infiltration table that is aligned with actual, published references that are used by stormwater, civil engineers, and landscape professionals. The proposed table includes both hydrologic groups, which a person could look up the property’s hydrologic group on a GIS map or NRCS map, as well as soil textures which an on-site soil test could verify. The proposed table is more conservative for clay soil types, and so would have less potential for overloading slower draining soils than the existing table. The proposed table has higher infiltration rates for sandy and loam soils, which are soils that are verified by studies (see references for Stormwater Manual) to infiltrate much much more water than the current table permits. To create the new table we converted the units provided in the referenced table from inches/hour to gallons/day as shown in the reference material. This is the source for the steady state infiltration rates: Minnesota Stormwater Manual 2013 -thirty guidance manuals and many other stormwater references were reviewed to compile recommended infiltration rates. All of these sources use the following studies as the basis for their recommended infiltration rates: (1) Rawls, Brakensiek and Saxton (1982); (2) Rawls, Gimenez and Grossman (1998); (3) Bouwer and Rice (1984); and (4) Urban Hydrology for Small Watersheds (NRCS). SWWD, 2005, provides field documented data that supports the proposed infiltration rates. (view reference list here https://stormwater.pca.state.mn.us/index.php?title=References) The Full Minnesota Stormwater Manual is available on-line here: https://stormwater.pca.state.mn.us/index.php?title=Main_Page
CHAPTER 15 - ALTERNATE WATER SOURCES FOR NONPOTABLE APPLICATIONS

1501.7 Minimum Water Quality Requirements. The minimum water quality for alternate water source systems shall meet the applicable water quality requirements for the intended application as determined by the Authority Having Jurisdiction. In the absence of water quality requirements, for on-site treated nonpotable systems, the water quality requirements of EPA/600/R-12/618-2012, IAPMO IGC 324 or NSF 350 shall apply. The EPA/625/R-04/108 contains recommended water reuse guidelines to assist regulatory agencies to develop, revise, or expand alternate water source water quality standards.

Exception: Water treatment is not required for gray water used for subsurface irrigation.

1506.7 On-Site Treated Nonpotable Water Devices and Systems. Devices or equipment used to treat on-site treated nonpotable water to maintain the minimum water quality requirements determined by the Authority Having Jurisdiction shall be listed or labeled (third-party certified) by a listing agency (accredited conformity assessment body) or approved for the intended application. Devices or equipment used to treat on-site treated nonpotable water for use in the water closet and urinal flushing, surface irrigation, and similar applications shall comply with IAPMO IGC 324, NSF 350 or approved by the Authority Having Jurisdiction.

CHAPTER 16 - NONPOTABLE RAINWATER CATCHMENT SYSTEMS

1603.5 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 be in accordance with Table 1603.5, EPA/600/R-12/618-2012, IAPMO IGC 324 or NSF 350.

Exception: No treatment is required for rainwater used for subsurface or nonsprinkled surface irrigation where the maximum storage volume is less than 360 gallons (1363 L).

1603.5.1 Treatment. If the quality of the tested water cannot consistently be maintained at the minimum levels specified in Table 1603.5, then the system shall be equipped with an appropriate treatment device meeting applicable NSF standards referenced in Chapter 17.
**TABLE 1701.1**
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA/600/R-12/618-2012</td>
<td>Guidelines for Water Reuse</td>
<td>Miscellaneous</td>
<td>1501.7</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**Note:** IAPMO IGC 324 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

**Note:** EPA/600/R-12/618-2012 does not meet the requirements for a mandatory reference standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

**TABLE 1701.2**
**STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA/600/R-12/618-2012</td>
<td>Guidelines for Water Reuse</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The 2019 edition of the IAPMO IGC 324 has been greatly improved. There was input from the San Francisco Department of Public Health (SFDPH) in developing this latest edition.

In addition to the below substantiation, please see support letter from LADWP for the Technical Committee review.

IAPMO IGC 324 covers residential, multi-family, and commercial use applications intended to process water from alternate water sources such as greywater, rainwater, stormwater air conditioning condensate, cooling tower makeup, vehicle wash and other non-potable reuse applications not specifically listed, for use in subsurface and/or surface irrigation and toilet/urinal flushing applications, and specifies requirements for materials, physical characteristics, performance testing, and markings. The standard also covers test plans and safety check (failure modes effects) that ensures the safety of the treated water.

Additionally, Section 1603.5.1 is being stricken as appropriate references are being proposed for inclusion in Section 1603.5. The proposed text in Section 1603.5 will provide guidance to the standards that apply to water treatment as options for harvested rainwater.

Supporting document(s) has been provided to the Technical Committee for review.

**COMMITTEE ACTION:** ACCEPT AS AMENDED BY THE TC

Amend proposal as follows:

**CHAPTER 15 - ALTERNATE WATER SOURCES FOR NONPOTABLE APPLICATIONS**

**1501.7 Minimum Water Quality Requirements.** The minimum water quality for alternate water source systems shall meet the applicable water quality requirements for the intended application as determined by the Authority Having Jurisdiction. In the absence of water quality requirements, for on-site treated nonpotable systems, the water quality requirements of EPA/600/R-12/618-2012, IAPMO IGC 324 or NSF 350 shall apply.

**Exception:** Water treatment is not required for gray water used for subsurface irrigation.

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<td>Guidelines for Water Reuse</td>
</tr>
<tr>
<td>IAPMO IGC 324-2019</td>
<td>Alternate Water Source Systems for Multi-Family, Residential, and Commercial Use</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

<table>
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<tr>
<th>TABLE 1701.2</th>
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</tr>
</thead>
<tbody>
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<td>DOCUMENT TITLE</td>
</tr>
<tr>
<td>EPA/600/R-12/618-2012</td>
<td>Guidelines for Water Reuse</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

COMMITTEE STATEMENT:
The modification removes reference to EPA/600/R-12/618-2012 as it is not written in mandatory language. EPA/600/R-12/618-2012 will remain as a reference guide in Table 1701.2. Also, in Section 1506.7, the phrase “listed or labeled” is being updated to “listed and labeled” for consistency in the code.

The 2019 edition of the IAPMO IGC 324 has been greatly improved. There was input from the San Francisco Department of Public Health (SFDPH) in developing this latest edition.

In addition to the below substantiation, please see support letter from the Los Angeles Department of Water and Power (LADWP) for the Technical Committee review.

IAPMO IGC 324 covers residential, multi-family, and commercial use applications intended to process water from alternate water sources such as greywater, rainwater, stormwater air conditioning condensate, cooling tower makeup, vehicle wash and other non-potable reuse applications not specifically listed, for use in subsurface and/or surface irrigation and toilet/urinal flushing applications, and specifies requirements for materials, physical characteristics, performance testing, and markings. The standard also covers test plans and safety check (failure modes effects) that ensures the safety of the treated water.

Additionally, Section 1603.5.1 is being stricken as appropriate references are being proposed for inclusion in Section 1603.5. The proposed text in Section 1603.5 will provide guidance to the standards that apply to water treatment as options for harvested rainwater.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

299
PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: 1501.7, 1506.7, 1603.5, 1603.5.1, Table 1701.1, Table 1701.2

Item #: 256

Comment #: 1

SUBMITTER: Derek DeLand
NSF International

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
This comment is being made to encourage the UPC Technical Committee (TC) to revisit Proposal Item #256 which was previously accepted as amended, and to change their vote to reject Item #256 in its entirety. The UPC is frequently adopted as official code/regulation and as such it is vital that standards and requirements therein are robust, useful, effective and protective of public health. There are concerning issues related to the IAPMO ICG 324 standard that the TC should consider carefully prior to adopting any language that incorporates this industry standard into the UPC. Though not a comprehensive list, these include the following:

1) IAPMO IGC 324 lacks any discussion on the analytical methods required for testing samples. It is unclear if it is up to the evaluator to determine the test method they deem most appropriate or if any test method is acceptable, but at a minimum this creates a troubling opportunity for inconsistent certifications.

2) QA/QC procedure requirements for field sampling such as chain of custody, field blanks, etc. are absent from IAPMO IGC 324. These are necessary to ensure results are reliable, consistent and accurate. QA/QC procedures are critical when examining the effectiveness of reuse systems and the safety impacts related to potential human exposures.

3) Biochemical Oxygen Demand (BOD) is a very common water quality parameter for treatment but is not included in IAPMO IGC 324 testing. Testing for BOD is mentioned in Water Research Foundation (WRF), National Blue-Ribbon Commission for Onsite Non-Potable Water Systems (NRBC) and EPA guidance, and is found in existing reuse regulations in places such as San Francisco.

4) The WRF and NBRC Onsite Non-Potable Water System Guidelines note turbidity in graywater is typically in a range of 20-200 NTU. IAPMO IGC 324 challenge test water levels only require a minimum of 10 NTU which is 50% less than the minimum levels commonly observed according to WRF and NRBC. Turbidity testing and control is vitally important for proper function of chlorine and UV treatment components.

Lastly, it is worth noting that not incorporating IAPMO IGC 324 into the UPC at this time does not mean systems meeting that standard would be prohibited from use. There is an existing provision in Section 1506.7 that allows for systems to be approved by the Authority Having Jurisdiction should they deem the system and any related validation testing as acceptable. So IAPMO IGC 324 compliant systems could remain approved for use under this clause.
Proposals

Item #: 264

UPC 2024  Section: 1507.0, Table 1701.1

SUBMITTER: Jim Kendzel
American Supply Association
Rep. Chairman of the Alternate Water Sources Task Group

RECOMMENDATION:
Add new text

1507.0 Onsite Blackwater Treatment Systems.
1507.1 General. The provisions of this section shall apply to the water quality, monitoring, design, construction, alteration, repair, and operation requirements of onsite blackwater treatment systems for nonpotable reuse.
1507.2 Allowable Use of Blackwater. Where approved or required by the Authority Having Jurisdiction, blackwater shall be permitted to be used in lieu of potable water for uses such as, but not limited, to water closets, urinals, clothes washers, ornamental plant irrigation, and dust suppression.
1507.3 Design and Construction Requirements. Onsite blackwater treatment systems shall meet the design, construction, and performance requirements of Section 1507.3.1 or Section 1507.3.2.
1507.3.1 Listed Blackwater Treatment Systems. Onsite blackwater treatment systems shall be listed to NSF 350, installed according to the manufacturer’s instructions, and commissioned in accordance with Section 1507.13.
1507.3.2 Alternative Design Systems. Where approved by the Authority Having Jurisdiction, onsite blackwater treatment systems for residential and commercial applications shall comply with the provisions of Section 1507.4 through Section 1507.15.
1507.4 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any blackwater treatment system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.
1507.5 Component Identification. System components shall be properly identified as to the manufacturer.
1507.6 Material Compatibility. Blackwater treatment systems shall be constructed of materials that are compatible with the type of pipe and fitting materials, water treatment, and water conditions in the system.

<table>
<thead>
<tr>
<th>WATER USE SCENARIO</th>
<th>ENTERIC VIRUSES</th>
<th>PARASITIC PROTOZOA</th>
<th>ENTERIC BACTERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ornamental plant irrigation*/dust suppression</td>
<td>8.0</td>
<td>7.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Indoor Use</td>
<td>8.5</td>
<td>7.0</td>
<td>6.0</td>
</tr>
</tbody>
</table>
* Non-food

1507.7 Log Reduction Targets. Blackwater treatment systems shall be designed to meet the log reduction targets as set forth in Table 1507.7. To meet the log reduction targets in Table 1507.7, treatment processes used in blackwater systems shall comply with Section 1507.9 for validation or be operated according to conditions approved by the Authority Having Jurisdiction.
1507.8 Effluent Water Quality Parameters. Blackwater treatment systems shall be designed to meet the effluent water quality parameters for water closet and urinal fixture use listed in Table 1507.8.
### TABLE 1507.8
**EFFLUENT WATER QUALITY PARAMETERS FOR WATER CLOSET AND URINAL FIXTURE USE**

<table>
<thead>
<tr>
<th></th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkalinity mg/L</td>
<td>20</td>
<td>200</td>
</tr>
<tr>
<td>TDS mg/L</td>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>Turbidity NTU</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>pH</td>
<td>6.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Odor</td>
<td>Non-Offensive</td>
<td></td>
</tr>
<tr>
<td>Oily Film and Foam</td>
<td>Visual Non-detectable</td>
<td></td>
</tr>
<tr>
<td>Free Chlorine Residual ppm</td>
<td>NA</td>
<td>4</td>
</tr>
<tr>
<td>Combined Chlorine ppm</td>
<td>NA</td>
<td>4</td>
</tr>
<tr>
<td>Chloramines mg/L</td>
<td>NA</td>
<td>4</td>
</tr>
</tbody>
</table>

#### 1507.9 Validation
Where required by the Authority Having Jurisdiction, treatment processes shall be tested to verify the pathogen reduction performance. The treatment processes shall be validated through third-party component validation or field verification using the challenge testing. The results of the third-party component validation and/or challenge testing shall be summarized in a validation report prepared by a Registered Design Professional. The validation report shall document the treatment technology’s log reduction performance, including information on the operating conditions and surrogate parameters.

#### 1507.10 Health and Safety
Treated blackwater shall not create a nuisance or odor, nor threaten human health, or damage the quality of surface water or groundwater.

#### 1507.11 Monitoring Requirements
Monitoring of blackwater treatment systems shall be based on the risk level in accordance with Table 1507.11(1). The parameters listed in Table 1507.11(2) shall be monitored by sensors placed in the effluent of the system and connected to a smart controller. The smart controller shall activate an alarm when the parameters in Table 1507.11(2) are outside the specifications and shall shut the system down when the alarm is not acknowledged after a period of 8 hours has elapsed. For Category 2, quarterly grab samples shall be taken out of the effluent and analyzed by an accredited lab. The sensors’ accuracy and response shall be validated upon commissioning of the system by an independent third party.

#### Table 1507.11(1)
**RISK LEVELS**

<table>
<thead>
<tr>
<th>RISK LEVEL</th>
<th>TREATED WATER USAGE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ornamental plant irrigation and dust suppression</td>
</tr>
<tr>
<td>2</td>
<td>Water closets, urinals, clothes washers</td>
</tr>
</tbody>
</table>

*See Section 1507.2 for other uses approved by the Authority Having Jurisdiction.

#### Table 1507.11(2)
**MONITORING PARAMETERS**

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>PARAMETERS TO BE MONITORED</th>
<th>VALIDATION PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turbidity, ORP, UV intensity (if used)</td>
<td>IGC 324 -Sensor validation procedure using 5.4.1.1 (a), (b), (c), and (d), as applicable</td>
</tr>
<tr>
<td>2</td>
<td>Turbidity, ORP, UV intensity (if used) pH, Quarterly lab Sample for Total Coliform</td>
<td></td>
</tr>
</tbody>
</table>

#### 1507.12 Design and Installation
The design and installation of onsite blackwater treatment systems shall meet the requirements of Section 1507.12.1 through Section 1507.12.6.

#### 1507.12.1 Connections to Potable or Reclaimed (Recycled) Water Systems
Blackwater treatment systems shall have no direct connection to any potable water supply or reclaimed (recycled) water source system. Potable water or reclaimed (recycled) water shall be permitted to be used as makeup water for a blackwater treatment system provided the potable or reclaimed (recycled) water supply connection is protected by an airgap.

#### 1507.12.2 Bypass Connection
A bypass shall be provided for the input connection to the blackwater treatment system.
The bypass shall be a diverter valve normally open to the blackwater treatment system. The normally closed port of the diverter valve shall be connected directly to the plumbing drainage system in accordance with this code.

1507.12.3 Overflow Connection. Blackwater treatment overflow shall be connected directly to the plumbing drainage system. The overflow shall be provided with a backwater valve at the point of connection to the plumbing drainage system. The backwater valve shall be accessible for inspection and maintenance.

1507.12.4 Fail-Safe Mechanisms. Blackwater treatment systems shall be equipped with an automatic shutdown of the treatment process when a malfunction occurs.

1507.12.5 Flow Meter Totalizer. Buildings with blackwater treatment systems shall include a flow meter totalizer on the treated blackwater distribution system and a flow meter totalizer on the potable make-up water connection to the blackwater treatment system.

1507.12.6 Cross-Connection Inspection and Testing. A cross-connection test is required in accordance with Section 1502.0. Before the building is occupied or the system is activated, the installer shall perform the initial cross-connection test in the presence of the Authority Having Jurisdiction. The test shall be ruled successful by the Authority Having Jurisdiction before final approval is granted.

1507.13 Commissioning. Onsite blackwater treatment systems shall be commissioned in accordance with the requirements of Section 1507.13.1 through Section 1507.13.4.

1507.13.1 Commissioning Requirements. Commissioning of blackwater treatment systems shall be included in the design and construction processes of the project. Commissioning shall be performed by a person who demonstrates competency in commissioning blackwater treatment systems as required by the Authority Having Jurisdiction.

1507.13.2 Commissioning Plan. The construction documents shall include the commissioning plan for the blackwater treatment system. The commissioning plan shall be approved by the Authority Having Jurisdiction prior to commissioning the blackwater treatment system. The commissioning plan shall include the following:

1. General project information.
2. Equipment to be tested, including the test methodology.
3. Processes to be tested.
4. Criteria or process for testing.
5. Criteria for acceptance.
6. Commissioning team contact information.
7. Commissioning process activities, schedules, and responsibilities.
8. Plans for the completion of functional performance testing, post construction documentation and training, and the commissioning report.

1507.13.3 Performance Testing. Performance tests shall verify that the installation and operation of the equipment of the blackwater treatment system is in accordance with the approved plans and specifications. The performance test report shall include the equipment tested, the testing methods utilized, and proof of proper calibration of the equipment.

1507.13.4 Commissioning Report. The commissioning report shall be submitted to the Authority Having Jurisdiction.

1507.14 Operation and Maintenance Manual. An operation and maintenance manual shall be provided in accordance with Section 1501.6 and shall also include the following:

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

1507.15 Inspection. Field inspections shall take place during and after construction while the contractor is on-site to verify that the blackwater treatment system components have been properly supplied and installed according to the plans and specifications used for installation. Record drawings shall be maintained with changes to the approved plans by the contractor and available for periodic inspection as needed.

Chapter 2 Definitions

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

205.0 -C- Challenge Test. The evaluation of a unit treatment process for pathogen log10 reduction performance using selected surrogate or indigenous constituents. This includes a detailed technology evaluation study conducted to challenge the treatment technology over a wide range of operational conditions.

Commissioning. The activities associated with bringing a new process into normal working condition.

208.0 -F- Field Verification. Performance confirmation study conducted using challenge testing, including surrogate microorganisms and/or other non-biological surrogates, usually during startup and commissioning.
**Log Reduction.** The removal of a pathogen or surrogate in a unit process expressed in \( \log_{10} \) units of the effluent concentration over the influent concentration (e.g., a 1-log reduction equates to 90% removal, 2-log reduction to 99% removal, 3-log reduction to 99.9% removal, and so on).

**Log Reduction Target (LRT).** The \( \log_{10} \) reduction target for the specified pathogen group (e.g., viruses, bacteria, or protozoa) to achieve the identified level of risk to individuals (e.g., \( 10^{-4} \) infection per year).

**Surrogate.** A biological, chemical, or physical parameter used to verify pathogen reductions performances.

**Validation Report.** Report documenting the results of a challenge test conducted during field verification.

### TABLE 1701.1

<table>
<thead>
<tr>
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<th>APPLICATION</th>
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<tbody>
<tr>
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<td>Table 1507.11(2)</td>
</tr>
</tbody>
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(portions of table not shown remain unchanged)

Note: IAPMO IGC 324 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

**SUBSTANTIATION:**

The Alternate Water Task Group (AWTG) proposes comprehensive requirements related to the water quality, monitoring, design, construction, commissioning, alteration, repair, and operation requirements of blackwater and stormwater systems for non-potable water reuse. These requirements for a properly designed system, together with appropriate construction, operation, and maintenance, will help ensure blackwater and stormwater systems will be implemented safely and reliably.

The AWTG proposes to incorporate health risk-based water quality requirements for blackwater and stormwater systems. The risk-based water quality approach was developed through recent research by the National Water Research Institute (NWRI) and the Water Research Foundation (WRF), culminating in the report Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems. Utilizing similar methodology as is employed in potable reuse and drinking water regulations, the risk-based LRTs align with the Water Safety Plan approach promoted by the World Health Organization. Blackwater and stormwater may contain pathogenic microorganisms that, if not properly treated, can cause infection due to exposure to these waters when recycled and used onsite. The intent of the risk-based framework is to determine the appropriate level of treatment for pathogens that is needed to protect public health, accounting for such factors as the source water quality, specific end use, and acceptable risk of infection from exposure to the treated water. The risk threshold used for this application is the same as has been previously applied in the context of municipal drinking water, i.e. exposure to this water via toilet flushing, irrigation, and other non-potable uses poses no greater risk than drinking municipally supplied drinking water. Because the amount of pathogen reduction for reuse usually spans orders of magnitude, pathogen treatment requirements are specified in terms of \( \log_{10} \) reduction; 1-log10 reduction equates to 90% removal, 2-log10 reduction to 99% removal, 3-log10 reduction to 99.9% removal, and so on. The treatment requirements developed using the risk-based methodology in this case are called log reduction targets, or LRTs. The LRTs were developed using a Quantitative Microbial Risk Assessment (QMRA). QMRA is a scientific approach to estimating the potential human health risks associated with exposure to microbial hazards (in this case, human pathogenic viruses, bacteria, and protozoa). LRTs for blackwater and stormwater reuse for unrestricted irrigation and toilet flushing were developed based on the annual risk level of 10-4 infections per person per year. Unit treatment processes that are effective at removing and/or inactivating pathogens can be used to meet the LRTs. In most cases, several unit processes are needed in series to provide sufficient treatment. The ability of unit processes to provide a certain level of treatment is verified through the use of ongoing monitoring and, in some cases, validation. For some unit processes, validation is critical to determine how the process can be used to achieve the LRTs. The AWTG also proposes to incorporate a monitoring approach for blackwater and stormwater systems that aligns with the research. The framework for monitoring deviates from traditional approaches of monitoring fecal indicator organisms (FIOS) in grab samples because there are recognized limitations of using FIOs. The primary limitation of FIO monitoring is that it cannot be done continuously to ensure safe water is delivered to the end use at...
all times. Rather, the AWTG is proposing continuous water quality monitoring of surrogate parameters such as turbidity, residual chlorine, ultraviolet transmittance, and others to verify that treatment processes are operating as designed.

Discussion: The AWTG supports the use of a health risk-based approach to guide treatment and design requirements for blackwater and stormwater systems because it ensures that systems implemented using this framework are safe and reliable. The requirements being proposed are intended to ensure that public health is protected while still allowing for flexibility in design, as it does not prescribe that specific treatment processes must be used. It is timely that AWTG is proposing these requirements because several states have recently moved forward to adopt the risk-based framework at the state level. Much of this work has been driven by the work of the National Blue Ribbon Commission for Onsite Non-potable Water Systems, a coalition of public health agencies and water and wastewater utilities committed to advancing the safe, practical, and sustainable implementation of alternate water source systems. As a result of the Commission's work, several states including California, Colorado, Minnesota, Oregon, Washington, and Hawaii are proposing legislation to adopt the risk-based approach. Therefore, institutionalizing the risk-based approach in the UPC will create further consistency across the country by aligning plumbing and health code requirements for alternate water source systems. Resources: The AWTG used the following resources to develop the proposed text for both stormwater and blackwater treatment systems. These resources provided the AWTG with a technically sound template for the development of requirements for blackwater and stormwater treatment systems that fit well into the both the scope and format structure of model codes.


COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT: There are concerns with onsite blackwater treatment systems. Such systems may be better dealt with at a local level by the health department. IAPMO IGC 324 does not cover black water. The language does not provide sufficient technical justification to warrant such change. The language does reference an appropriate NSF 350 standard that covers black water systems, however, the language needs additional work.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 24 NEGATIVE: 1 NOT RETURNED: 1 Daniels

EXPLANATION OF NEGATIVE:

BALLANCO: The proposed change would harmonize the code with WE-Stand. This change was properly substantiated and should have been accepted as submitted.

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Appended Comments

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PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 1507.0 - 1507.11  Item #: 264

SUBMITTER: Jim Kendzel  American Supply Association  Rep. Chair, Alternate Water Sources Task Group

RECOMMENDATION: Add new text

Request to accept the code change proposal as submitted by this public comment.
**SUBSTANTIATION:**
The Alternate Water Task Group (AWTG) proposes comprehensive requirements related to the water quality, monitoring, design, construction, commissioning, alteration, repair, and operation requirements of blackwater and stormwater systems for non-potable water reuse. These requirements for a properly designed system, together with appropriate construction, operation, and maintenance, will help ensure blackwater and stormwater systems will be implemented safely and reliably.

The AWTG proposes to incorporate health risk-based water quality requirements for blackwater and stormwater systems. The risk-based water quality approach was developed through recent research by the National Water Research Institute (NWRI) and the Water Research Foundation (WRF), culminating in the report Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems. Utilizing similar methodology as is employed in potable reuse and drinking water regulations, the risk-based LRTs align with the Water Safety Plan approach promoted by the World Health Organization. Blackwater and stormwater may contain pathogenic microorganisms that, if not properly treated, can cause infection due to exposure to these waters when recycled and used onsite. The intent of the risk-based framework is to determine the appropriate level of treatment for pathogens that is needed to protect public health, accounting for such factors as the source water quality, specific end use, and acceptable risk of infection from exposure to the treated water. The risk threshold used for this application is the same as has been previously applied in the context of municipal drinking water, i.e. exposure to this water via toilet flushing, irrigation, and other non-potable uses poses no greater risk than drinking municipally supplied drinking water. Because the amount of pathogen reduction for reuse usually spans orders of magnitude, pathogen treatment requirements are specified in terms of log10 reduction; 1-log10 reduction equates to 90% removal, 2-log10 reduction to 99% removal, 3-log10 reduction to 99.9% removal, and so on. The treatment requirements developed using the risk-based methodology in this case are called log reduction targets, or LRTs. The LRTs were developed using a Quantitative Microbial Risk Assessment (QMRA). QMRA is a scientific approach to estimating the potential human health risks associated with exposure to microbial hazards (in this case, human pathogenic viruses, bacteria, and protozoa). LRTs for blackwater and stormwater reuse for unrestricted irrigation and toilet flushing were developed based on the annual risk level of 10-4 infections per person per year. Unit treatment processes that are effective at removing and/or inactivating pathogens can be used to meet the LRTs. In most cases, several unit processes are needed in series to provide sufficient treatment. The ability of unit processes to provide a certain level of treatment is verified through the use of ongoing monitoring and, in some cases, validation. For some unit processes, validation is critical to determine how the process can be used to achieve the LRTs. The AWTG also proposes to incorporate a monitoring approach for blackwater and stormwater systems that aligns with the research. The framework for monitoring deviates from traditional approaches of monitoring fecal indicator organisms (FIos) in grab samples because there are recognized limitations of using FIos. The primary limitation of monitoring is that it cannot be done continuously to ensure safe water is delivered to the end use at all times. Rather, the AWTG is proposing continuous water quality monitoring of surrogate parameters such as turbidity, residual chlorine, ultraviolet transmittance, and others to verify that treatment processes are operating as designed.

Discussion: The AWTG supports the use of a health riskbased approach to guide treatment and design requirements for blackwater and stormwater systems because it ensures that systems implemented using this framework are safe and reliable. The requirements being proposed are intended to ensure that public health is protected while still allowing for flexibility in design, as it does not prescribe that specific treatment processes must be used. It is timely that the AWTG is proposing these requirements because several states have recently moved forward to adopt the risk-based framework at the state level. Much of this work has been driven by the work of the National Blue Ribbon Commission for Onsite Non-potable Water Systems, a coalition of public health agencies and water and wastewater utilities committed to advancing the safe, practical, and sustainable implementation of alternate water source systems. As a result of the Commission's work, several states including California, Colorado, Minnesota, Oregon, Washington, and Hawaii are proposing legislation to adopt the risk-based approach. Therefore, institutionalizing the riskbased approach in the UPC will create further consistency across the country by aligning plumbing and health code requirements for alternate water source systems. Resources: The AWTG used the following resources to develop the proposed text for both stormwater and blackwater treatment systems. These resources provided the AWTG with a technically sound template for the development of requirements for blackwater and stormwater treatment systems that fit well into the both the scope and format structure of model codes.
Proposals

Item #: 265

UPC 2024  Section: 1508.0, Table 1701.1

SUBMITTER: Jim Kendzel
American Supply Association
Rep. Chairman of the Alternate Water Sources Task Group

RECOMMENDATION:
Add new text

1508.0 Onsite Stormwater Treatment Systems.
1508.1 General. The provisions of this section shall apply to the water quality, monitoring, design, construction, alteration, repair, and operation requirements of onsite stormwater treatment systems for nonpotable use.
1508.2 Allowable Use of Stormwater. Where approved or required by the Authority Having Jurisdiction, stormwater shall be permitted to be used in lieu of potable water for uses such as, but not limited to, water closets, urinals, clothes washers, ornamental plant irrigation, and dust suppression.
1508.3 Design and Construction Requirements. Onsite stormwater treatment systems shall meet the design, construction, and performance requirements of Section 1508.3.1 or Section 1508.3.2.
1508.3.1 Listed Stormwater Treatment Systems. Onsite stormwater treatment systems shall be listed to ASPE/ARCSA 78, installed according to the manufacturer’s instructions, and commissioned in accordance with Section 1508.13.
1508.3.2 Alternative Design Systems. Where approved by the Authority Having Jurisdiction, onsite stormwater treatment systems for residential and commercial applications shall comply with the provisions of Sections 1508.4 through Section 1508.15.
1508.4 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any stormwater treatment system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.
1508.5 Component Identification. System components shall be properly identified as to the manufacturer.
1508.6 Material Compatibility. Stormwater treatment systems shall be constructed of materials that are compatible with the type of pipe and fitting materials, water treatment, and water conditions in the system.
1508.7 Log Reduction Targets. Stormwater treatment systems shall be designed to meet the log reduction targets as set forth in Table 1508.7. To meet the log reduction in Table 1508.7, treatment processes used in stormwater systems shall comply with Section 1508.8 for validation or be operated according to conditions approved by the Authority Having Jurisdiction.
1508.8 Effluent Water Quality Parameters. Stormwater treatment systems shall be designed to meet the effluent water quality parameters for water closet and urinal fixture use listed in Table 1508.8.
1508.9 Validation. Where required by the Authority Having Jurisdiction, treatment processes shall be tested to verify the pathogen reduction performance. The treatment processes shall be validated through third-party component validation or field verification using challenge testing. The results of the third-party component validation and/or challenge testing shall be summarized in a validation report prepared by a registered design professional. The validation report shall document the treatment technology's log reduction performance, including information on the operating conditions and surrogate parameters.
### TABLE 1508.7

**LOG REDUCTION TARGETS FOR \(10^{-4}\) INFECTIONS PER PERSON PER YEAR BENCHMARKS FOR STORMWATER TREATMENT SYSTEMS**

<table>
<thead>
<tr>
<th>WATER USE SCENARIO</th>
<th>ENTERIC VIRUSES</th>
<th>PARASITIC PROTOZOA</th>
<th>ENTERIC BACTERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stormwater Greater Than 0.1% Fecal Contamination Contribution²</td>
<td>5.0</td>
<td>4.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Ornamental plant irrigation¹/dust suppression</td>
<td>5.5</td>
<td>5.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Indoor Use</td>
<td>3.5</td>
<td>3.5</td>
<td>3.0</td>
</tr>
<tr>
<td>Stormwater with less than or equal to 0.1% fecal contamination contribution²</td>
<td>3.0</td>
<td>2.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Ornamental plant irrigation¹/dust suppression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indoor Use</td>
<td>3.5</td>
<td>3.5</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Notes:**
1. Non-food
2. Stormwater can contain some quantity of fecal contamination. The extent of fecal contamination present will depend on site-specific conditions. The appropriate LRT to apply for a stormwater treatment system depend on the site-specific extent of likely contamination of Stormwater with fecal contamination.

### TABLE 1508.8

**EFFLUENT WATER QUALITY PARAMETERS FOR WATER CLOSET AND URINAL FIXTURE USE**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkalinity mg/L</td>
<td>20</td>
<td>200</td>
</tr>
<tr>
<td>TDS mg/L</td>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>Turbidity NTU</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>pH</td>
<td>6.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Odor</td>
<td>Non-Offensive</td>
<td></td>
</tr>
<tr>
<td>Oily Film and Foam</td>
<td>Visual Non-detectable</td>
<td></td>
</tr>
<tr>
<td>Free Chlorine Residual ppm</td>
<td>NA</td>
<td>4</td>
</tr>
<tr>
<td>Combined Chlorine ppm</td>
<td>NA</td>
<td>4</td>
</tr>
<tr>
<td>Chloramines mg/L</td>
<td>NA</td>
<td>4</td>
</tr>
</tbody>
</table>

### 1508.10 Health and Safety

Treated stormwater shall not create a nuisance or odor, nor threaten human health, or damage the quality of surface water or groundwater.

### 1508.11 Monitoring Requirements

Monitoring of stormwater treatment systems shall be based on the risk level in accordance with Table 1508.11(1). The parameters listed in Table 1508.11(2) shall be monitored by sensors placed in the effluent of the system and connected to a smart controller. The smart controller shall activate an alarm when the parameters in Table 1508.11(2) are outside the specifications and shall shut the system down when the alarm is not acknowledged after a period of 8 hours has elapsed. For Category 2, quarterly grab samples shall be taken out of the effluent and analyzed by an accredited lab. The sensors' accuracy and response shall be validated upon commissioning of the system by an independent third party.

### 1508.12 Design and Installation

The design and installation of onsite stormwater treatment systems shall meet the requirements of Section 1508.12.1 through Section 1508.12.6.

### 1508.12.1 Connections to Potable or Reclaimed (Recycled) Water Systems

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

### 1508.12.2 Bypass Connection

A bypass shall be provided for the input connection to the stormwater treatment system. The bypass shall be a diverter valve normally open to the stormwater treatment system. The normally closed port of the diverter valve shall be connected directly to the storm drainage system or combined sewer system in accordance with this code.
TABLE 1508.11(1)
RISK LEVELS

<table>
<thead>
<tr>
<th>RISK LEVEL</th>
<th>TREATED WATER USAGE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ornamental plant irrigation and dust suppression</td>
</tr>
<tr>
<td>2</td>
<td>Water closets, urinals, clothes washers</td>
</tr>
</tbody>
</table>

* See Section 1508.2 for other uses approved by the Authority Having Jurisdiction.

TABLE 1508.11(2)
MONITORING PARAMETERS

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>PARAMETERS TO BE MONITORED</th>
<th>VALIDATION PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turbidity, ORP, UV intensity (if used)</td>
<td>IGC 324 - Sensor validation procedure using 5.4.1.1 (a), (b), (c), and (d), as applicable</td>
</tr>
<tr>
<td>2</td>
<td>Turbidity, ORP, UV intensity (if used), pH, Quarterly lab Sample for Total Coliform</td>
<td></td>
</tr>
</tbody>
</table>

1508.12.3 Overflow Connection. Stormwater treatment overflow shall be connected directly to the storm drainage or combined sewer system in accordance with this code. The overflow shall be provided with a backwater valve at the point of connection to the storm drainage or combined sewer system. The backwater valve shall be accessible for inspection and maintenance.

1508.12.4 Fail-Safe Mechanisms. Stormwater treatment systems must be equipped with features that result in a controlled and non-hazardous automatic shutdown of the treatment process in the event of a malfunction.

1508.12.5 Flow Meter Totalizer. Buildings with stormwater treatment systems shall include a flow meter totalizer on the treated stormwater distribution system and a flow meter totalizer on the potable make-up water pipeline to the stormwater treatment system.

1508.12.6 Cross-Connection Inspection and Testing. A cross-connection test is required in accordance with Section 1502.0. Before the building is occupied or the system is activated, the installer shall perform the initial cross-connection test in the presence of the Authority Having Jurisdiction. The test shall be ruled successful by the Authority Having Jurisdiction before final approval is granted.

1508.13 Commissioning. Onsite stormwater treatment systems shall be commissioned in accordance with the requirements of Section 1508.13.1 through Section 1508.13.4.

1508.13.1 Commissioning Requirements. Commissioning for stormwater treatment systems shall be included in the design and construction processes of the project. Commissioning shall be performed by a person who demonstrates competency in commissioning stormwater treatment systems as required by the Authority Having Jurisdiction.

1508.13.2 Commissioning Plan. The construction documents shall include the commissioning plan for the stormwater treatment system. The commissioning plan shall be approved by the Authority Having Jurisdiction prior to commissioning the stormwater treatment system. The commissioning plan shall include the following:

1. General project information.
2. Equipment to be tested, including the test methodology.
3. Processes to be tested.
4. Criteria or process for testing.
5. Criteria or process for acceptance.
6. Commissioning team contact information.
7. Commissioning process activities, schedules, and responsibilities.
8. Plans for the completion of functional performance testing, post construction documentation and training, and the commissioning report.

1508.13.3 Performance Testing. Performance tests shall verify that the installation and operation of the equipment of the stormwater treatment system is in accordance with the approved plans and specifications. The performance test report shall include the equipment tested, the testing methods utilized, and proof of proper calibration of the equipment.

1508.13.4 Commissioning Report. The commissioning report shall be submitted to the Authority Having Jurisdiction.

1508.14 Operation and Maintenance Manual. An operation and maintenance manual shall be provided in accordance with Section 1501.6 and shall also include the following:
Instructions on operating and maintaining the system, including treatment process operations, instrumentation and alarms, and chemicals storage and handling.

Site equipment inventory and maintenance notes.

Equipment/system warranty documentation and information.

As-Built design drawings.

Details on training requirements and qualifications of personnel responsible for operating the system.

Maintenance schedule.

**1508.15 Inspection.** Field inspections shall take place during and after construction while the contractor is on-site to verify that the stormwater treatment system components have been properly supplied and installed according to the plans and specifications used for installation. Record drawings shall be maintained with changes to the approved plans by the contractor and available for periodic inspection as needed.

### Chapter 2 Definitions

#### 205.0 -C-
**Challenge Test.** The evaluation of a unit treatment process for pathogen $\log_{10}$ reduction performance using selected surrogate or indigenous constituents. This includes a detailed technology evaluation study conducted to challenge the treatment technology over a wide range of operational conditions.

#### 208.0 -F-
**Field Verification.** Performance confirmation study conducted using challenge testing, including surrogate microorganisms and/or other non-biological surrogates, usually during startup and commissioning.

#### 214.0 -L-
**Log$_{10}$ Reduction.** The removal of a pathogen or surrogate in a unit process expressed in $\log_{10}$ units of the effluent concentration over the influent concentration (e.g., a 1-log reduction equates to 90% removal, 2-log reduction to 99% removal, 3-log reduction to 99.9% removal, and so on).

**Log$_{10}$ Reduction Target (LRT).** The $\log_{10}$ reduction target for the specified pathogen group (e.g., viruses, bacteria, or protozoa) to achieve the identified level of risk to individuals (e.g., $10^{-4}$ infection per year).

#### 221.0 -S-
**Stormwater.** Natural precipitation that has contacted a surface at grade, below grade, or above ground parking surfaces.

**Surrogate.** A biological, chemical, or physical parameter used to verify pathogen reductions performances.

#### 224.0 -V-
**Validation Report.** Report documenting the results of a challenge test conducted during field verification.

### TABLE 1701.1

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASPE/ARCSA 78-2015</td>
<td>Stormwater Harvesting System Design for Direct End-Use Applications</td>
<td>Miscellaneous</td>
<td>1508.3.1</td>
</tr>
<tr>
<td>IAPMO IGC 324-2019</td>
<td>Alternate Water Source Systems for Multi-Family, Residential, and Commercial Use</td>
<td>Miscellaneous</td>
<td>Table 1508.11(2)</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**Note:** ASPE/ARCSA 78 and IAPMO IGC 324 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

**SUBSTANTIATION:**
The Alternate Water Task Group (AWTG) proposes comprehensive requirements related to the water quality, monitoring, design, construction, commissioning, alteration, repair, and operation requirements of blackwater and stormwater systems for non-potable water reuse. These requirements for a properly designed system, together with appropriate construction, operation, and maintenance, will help ensure blackwater and stormwater systems will be implemented safely and reliably. The AWTG proposes to incorporate health risk-based water quality requirements for blackwater and stormwater systems. The risk-based water quality approach was developed through recent research by the National Water Research Institute (NWRI) and the Water Research Foundation (WRF), culminating...
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COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
Several parts of the proposed language is written in unenforceable language such as Sections 1508.10, 1508.12.4, and 1508.13. Parts of the proposal reads like a guide and may be better suited in the Appendix and updated with enforceable language.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 24 NEGATIVE: 1 NOT RETURNED: 1 Daniels
EXPLANATION OF NEGATIVE:

BALLANCO: The proposed change would harmonize the code with WE-Stand. This change was properly substantiated and should have been accepted as submitted.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Appendix T  Item #: 265
Submitter: Jim Kendzel  Comment #: 1
American Supply Association  Rep. Chair, Alternate Water Sources Task Group

RECOMMENDATION:
Add new text
Request to replace the code change proposal by this public comment.

Appendix T
Onsite Stormwater Treatment Systems

T 101.0 Onsite Stormwater Treatment Systems.
T 101.1 General. The provisions of this appendix shall apply to the water quality, monitoring, design, construction, alteration, repair, and operation requirements of onsite stormwater treatment systems for nonpotable use.
T 101.2 Allowable Use of Stormwater. Where approved or required by the Authority Having Jurisdiction, stormwater shall be permitted to be used in lieu of potable water for uses such as, but not limited to, water closets, urinals, clothes washers, ornamental plant irrigation, and dust suppression.
T 101.3 Design and Construction Requirements. Onsite stormwater treatment systems shall meet the design, construction, and performance requirements of Section T 101.3.1 or Section T 101.3.2.
T 101.3.1 Listed Stormwater Treatment Systems. Onsite stormwater treatment systems shall be listed to ARCSA/ASPE 78, installed according to the manufacturer's instructions, and commissioned in accordance with Section T 101.13.
T 101.3.2 Alternative Design Systems. Where approved by the Authority Having Jurisdiction, onsite stormwater treatment systems for residential and commercial applications shall comply with the provisions of Sections T 101.4 through Section T 101.15.
T 101.4 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any stormwater treatment system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.
T 101.5 Component Identification. System components shall be properly identified as to the manufacturer.
T 101.6 Material Compatibility. Stormwater treatment systems shall be constructed of materials that are compatible with the type of pipe and fitting materials, water treatment, and water conditions in the system.
T 101.7 Log Reduction Targets. Stormwater treatment systems shall be designed to meet the log reduction targets as set forth in Table T 101.7. To meet the log reduction in Table T 101.7, treatment processes used in stormwater systems shall comply with Section T 101.8 for validation or be operated according to conditions approved by the Authority Having Jurisdiction.
T 101.8 Effluent Water Quality Parameters. Stormwater treatment systems shall be designed to meet the effluent water quality parameters for water closet and urinal fixture use listed in Table T 101.8.
T 101.9 Validation. Where required by the Authority Having Jurisdiction, treatment processes shall be tested to verify the pathogen reduction performance. The treatment processes shall be validated through third-party component validation or field verification using challenge testing. The results of the third-party component validation and/or challenge testing shall be summarized in a validation report prepared by a registered design professional. The validation report shall document the treatment technology's log reduction performance, including information on the operating conditions and surrogate parameters.
TABLE T 101.7
LOG REDUCTION TARGETS FOR 10\textsuperscript{-4} INFECTIONS PER PERSON PER YEAR BENCHMARKS FOR STORMWATER TREATMENT SYSTEMS

<table>
<thead>
<tr>
<th>WATER USE SCENARIO</th>
<th>ENTERIC VIRUSES</th>
<th>PARASITIC PROTOZOA</th>
<th>ENTERIC BACTERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stormwater Greater Than 0.1% Fecal Contamination Contribution\textsuperscript{2}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ornamental plant irrigation\textsuperscript{1}/dust suppression</td>
<td>5.0</td>
<td>4.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Indoor Use</td>
<td>5.5</td>
<td>5.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Stormwater with less than or equal to 0.1% fecal contamination contribution\textsuperscript{2}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ornamental plant irrigation\textsuperscript{1}/dust suppression</td>
<td>3.0</td>
<td>2.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Indoor Use</td>
<td>3.5</td>
<td>3.5</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Notes:
\textsuperscript{1} Non-food
\textsuperscript{2} Stormwater can contain some quantity of fecal contamination. The extent of fecal contamination present will depend on site-specific conditions. The appropriate LRT to apply for a stormwater treatment system depend on the site-specific extent of likely contamination of Stormwater with fecal contamination.

TABLE T 101.8
EFFLUENT WATER QUALITY PARAMETERS FOR WATER CLOSET AND URINAL FIXTURE USE

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkalinity mg/L</td>
<td>20</td>
<td>200</td>
</tr>
<tr>
<td>TDS mg/L</td>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>Turbidity NTU</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>pH</td>
<td>6.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Odor</td>
<td>Non-Offensive</td>
<td></td>
</tr>
<tr>
<td>Oily Film and Foam</td>
<td>Visual Non-detectable</td>
<td></td>
</tr>
<tr>
<td>Free Chlorine Residual ppm</td>
<td>NA</td>
<td>4</td>
</tr>
<tr>
<td>Combined Chlorine ppm</td>
<td>NA</td>
<td>4</td>
</tr>
<tr>
<td>Chloramines mg/L</td>
<td>NA</td>
<td>4</td>
</tr>
</tbody>
</table>

T 101.10 Health and Safety. Potable water systems shall be protected against nonpotable water in accordance with Section 602.0 and Section 603.0 of this code.

T 101.11 Monitoring Requirements. Monitoring of stormwater treatment systems shall be based on the risk level in accordance with Table T 101.11(1). The parameters listed in Table T 101.11(2) shall be monitored by sensors placed in the effluent of the system and connected to a smart controller. The smart controller shall activate an alarm when the parameters in Table T 101.11(2) are outside the specifications and shall shut the system down when the alarm is not acknowledged after a period of 8 hours has elapsed. For Category 2, quarterly grab samples shall be taken out of the effluent and analyzed by an accredited lab. The sensors' accuracy and response shall be validated upon commissioning of the system by an independent third party.

T 101.12 Design and Installation. The design and installation of onsite stormwater treatment systems shall meet the requirements of Section T 101.12.1 through Section T 101.12.6.

T 101.12.1 Connections to Potable or Reclaimed (Recycled) Water Systems. Stormwater treatment systems shall have no direct connection to any potable water supply or reclaimed (recycled) water source system. Potable water or reclaimed (recycled) water shall be permitted to be used as makeup water for a stormwater treatment system provided the potable or reclaimed (recycled) water supply connection is protected by an airgap.

T 101.12.2 Bypass Connection. A bypass shall be provided for the input connection to the stormwater treatment system. The bypass shall be a diverter valve normally open to the stormwater treatment system. The normally closed port of the diverter valve shall be connected directly to the storm drainage system or combined sewer system in accordance with this code.
**TABLE T 101.11(1)**

**RISK LEVELS**

<table>
<thead>
<tr>
<th>RISK LEVEL</th>
<th>TREATED WATER USAGE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ornamental plant irrigation and dust suppression</td>
</tr>
<tr>
<td>2</td>
<td>Water closets, urinals, clothes washers</td>
</tr>
</tbody>
</table>

* See Section T 101.2 for other uses approved by the Authority Having Jurisdiction.

**TABLE T 101.11(2)**

**MONITORING PARAMETERS**

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>PARAMETERS TO BE MONITORED</th>
<th>VALIDATION PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turbidity, ORP, UV intensity (if used)</td>
<td>IGC 324 - Sensor validation procedure using 5.4.1.1 (a), (b), (c), and (d), as applicable</td>
</tr>
<tr>
<td>2</td>
<td>Turbidity, ORP, UV intensity (if used), pH, Quarterly lab Sample for Total Coliform</td>
<td></td>
</tr>
</tbody>
</table>

**T 101.12.3 Overflow Connection.** Stormwater treatment overflow shall be connected directly to the storm drainage or combined sewer system in accordance with this code. The overflow shall be provided with a backwater valve at the point of connection to the storm drainage or combined sewer system. The backwater valve shall be accessible for inspection and maintenance.

**T 101.12.4 Fail-Safe Mechanisms.** Stormwater treatment systems shall be equipped with an automatic shutdown device of the treatment process in the event of a malfunction.

**T 101.12.5 Flow Meter Totalizer.** Buildings with stormwater treatment systems shall include a flow meter totalizer on the treated stormwater distribution system and a flow meter totalizer on the potable make-up water pipeline to the stormwater treatment system.

**T 101.12.6 Cross-Connection Inspection and Testing.** A cross-connection test is required in accordance with Section 1502.0. Before the building is occupied or the system is activated, the installer shall perform the initial cross-connection test in the presence of the Authority Having Jurisdiction. The test shall be ruled successful by the Authority Having Jurisdiction before final approval is granted.

**T 101.13 Commissioning.** Onsite stormwater treatment systems shall be commissioned in accordance with the requirements of Section T 101.13.1 through Section T 101.13.4.

**T 101.13.1 Commissioning Requirements.** Commissioning for stormwater treatment systems shall be included in the design and construction processes of the project. Commissioning shall be performed by a person who demonstrates competency in commissioning stormwater treatment systems as required by the Authority Having Jurisdiction.

**T 101.13.2 Commissioning Plan.** The construction documents shall include the commissioning plan for the stormwater treatment system. The commissioning plan shall be approved by the Authority Having Jurisdiction prior to commissioning the stormwater treatment system. The commissioning plan shall include the following:

1. General project information.
2. Equipment to be tested, including the test methodology.
3. Processes to be tested.
4. Criteria or process for testing.
5. Criteria or process for acceptance.
6. Commissioning team contact information.
7. Commissioning process activities, schedules, and responsibilities.
8. Plans for the completion of functional performance testing, post construction documentation and training, and the commissioning report.

**T 101.13.3 Performance Testing.** Performance tests shall verify that the installation and operation of the equipment of the stormwater treatment system is in accordance with the approved plans and specifications. The performance test report shall include the equipment tested, the testing methods utilized, and proof of proper calibration of the equipment.

**T 101.13.4 Commissioning Report.** The commissioning report shall be submitted to the Authority Having Jurisdiction.

**T 101.14 Operation and Maintenance Manual.** An operation and maintenance manual shall be provided in accordance with Section 1501.6 and shall also include the following:
(1) Instructions on operating and maintaining the system, including treatment process operations, instrumentation and alarms, and chemicals storage and handling.
(2) Site equipment inventory and maintenance notes.
(3) Equipment/system warranty documentation and information.
(4) As-Built design drawings.
(5) Details on training requirements and qualifications of personnel responsible for operating the system.
(6) Maintenance schedule.

**T 101.15 Inspection.** Field inspections shall take place during and after construction while the contractor is on-site to verify that the stormwater treatment system components have been properly supplied and installed according to the plans and specifications used for installation. Record drawings shall be maintained with changes to the approved plans by the contractor and available for periodic inspection as needed.

**T 102.0 Definitions.**
**T 102.1 General.** For the purpose of this appendix, the following definitions shall apply:

**Challenge Test.** The evaluation of a unit treatment process for pathogen log_{10} reduction performance using selected surrogate or indigenous constituents. This includes a detailed technology evaluation study conducted to challenge the treatment technology over a wide range of operational conditions.

**Commissioning.** The activities associated with bringing a new process into normal working condition.

**Field Verification.** Performance confirmation study conducted using challenge testing, including surrogate microorganisms and/or other non-biological surrogates, usually during startup and commissioning.

**Log_{10} Reduction.** The removal of a pathogen or surrogate in a unit process expressed in log_{10} units of the effluent concentration over the influent concentration (e.g., a 1-log reduction equates to 90% removal, 2-log reduction to 99% removal, 3-log reduction to 99.9% removal, and so on).

**Log_{10} Reduction Target (LRT).** The log_{10} reduction target for the specified pathogen group (e.g., viruses, bacteria, or protozoa) to achieve the identified level of risk to individuals (e.g., 10^{-4} infection per year).

**Stormwater.** Natural precipitation that has contacted a surface at grade, below grade, or above ground parking surfaces.

**Surrogate.** A biological, chemical, or physical parameter used to verify pathogen reductions performances.

**Validation Report.** Report documenting the results of a challenge test conducted during field verification.

### TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCSA/ASPE 78-2015</td>
<td>Stormwater Harvesting System Design for Direct End-Use Applications</td>
<td>Miscellaneous</td>
</tr>
<tr>
<td>IAPMO IGC 324-2019</td>
<td>Alternate Water Source Systems for Multi-Family, Residential, and Commercial Use</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The Technical Committee recommended that this proposal be resubmitted as an appendix. It has been reformatted and some of the language updated to read in an enforceable manner. The previous substantiation is still applicable.

The Alternate Water Task Group (AWTG) proposes comprehensive requirements related to the water quality, monitoring, design, construction, commissioning, alteration, repair, and operation requirements of blackwater and stormwater systems for non-potable water reuse. These requirements for a properly designed system, together with appropriate construction, operation, and maintenance, will help ensure blackwater and stormwater systems will be implemented safely and reliably.

The AWTG proposes to incorporate health risk-based water quality requirements for blackwater and stormwater systems. The risk-based water quality approach was developed through recent research by the National Water Research Institute (NWRI) and the Water Research Foundation (WRF), culminating in the report Risk-Based Framework for the Development of Public Health Guidance for Decentralized Non-Potable Water Systems.

Utilizing similar methodology as is employed in potable reuse and drinking water regulations, the risk-based LRTs align with the Water Safety Plan approach promoted by the World Health Organization. Blackwater and stormwater may contain pathogenic microorganisms that, if not properly treated, can cause infection due to exposure to these waters when recycled and used onsite. The intent of the risk-based framework is to determine the appropriate level
of treatment for pathogens that is needed to protect public health, accounting for such factors as the source water quality, specific end use, and acceptable risk of infection from exposure to the treated water. The risk threshold used for this application is the same as has been previously applied in the context of municipal drinking water, i.e. exposure to this water via toilet flushing, irrigation, and other nonpotable uses poses no greater risk than drinking municipally supplied drinking water. Because the amount of pathogen reduction for reuse usually spans orders of magnitude, pathogen treatment requirements are specified in terms of log10 reduction; 1-log10 reduction equates to 90% removal, 2-log10 reduction to 99% removal, 3-log10 reduction to 99.9% removal, and so on.

The treatment requirements developed using the risk-based methodology in this case are called log reduction targets, or LRTs. The LRTs were developed using a Quantitative Microbial Risk Assessment (QMRA). QMRA is a scientific approach to estimating the potential human health risks associated with exposure to microbial hazards (in this case, human pathogenic viruses, bacteria, and protozoa). LRTs for blackwater and stormwater reuse for unrestricted irrigation and toilet flushing were developed based on the annual risk level of 10^-4 infections per person per year. Unit treatment processes that are effective at removing and/or inactivating pathogens can be used to meet the LRTs.

In most cases, several unit processes are needed in series to provide sufficient treatment. The ability of unit processes to provide a certain level of treatment is verified through the use of ongoing monitoring and, in some cases, validation. For some unit processes, validation is critical to determine how the process can be used to achieve the LRTs. The AWTG also proposes to incorporate a monitoring approach for blackwater and stormwater systems that aligns with the research. The framework for monitoring deviates from traditional approaches of monitoring fecal indicator organisms (FIOs) in grab samples because there are recognized limitations of using FIOs. The primary limitation of FIO monitoring is that it cannot be done continuously to ensure safe water is delivered to the end use at all times. Rather, the AWTG is proposing continuous water quality monitoring of surrogate parameters such as turbidity, residual chlorine, ultraviolet transmittance, and others to verify that treatment processes are operating as designed.

Discussion: The AWTG supports the use of a health risk-based approach to guide treatment and design requirements for blackwater and stormwater systems because it ensures that systems implemented using this framework are safe and reliable. The requirements being proposed are intended to ensure that public health is protected while still allowing for flexibility in design, as it does not prescribe that specific treatment processes must be used. It is timely that AWTG is proposing these requirements because several states have recently moved forward to adopt the risk-based framework at the state level.

Much of this work has been driven by the work of the National Blue Ribbon Commission for Onsite Nonpotable Water Systems, a coalition of public health agencies and water and wastewater utilities committed to advancing the safe, practical, and sustainable implementation of alternate water source systems. As a result of the Commission's work, several states including California, Colorado, Minnesota, Oregon, Washington, and Hawaii are proposing legislation to adopt the risk-based approach. Therefore, institutionalizing the risk-based approach in UPC will create further consistency across the country by aligning plumbing and health code requirements for alternate water source systems.

Resources: The AWTG used the following resources to develop the proposed text for both stormwater and blackwater treatment systems. These resources provided the AWTG with a technically sound template for the development of requirements for blackwater and stormwater treatment systems that fit well into the both the scope and format structure of model codes.

Proposals

Item #: 266

UPC 2024  Section: 1601.2, 1601.3, 1603.3, 1603.6, 1603.7, 1605.1, 1605.3.2

SUBMITTER: Jim Kendzel
American Supply Association
Rep. Chairman of the Alternate Water Sources Task Group

RECOMMENDATION:
Revise text

1601.0 General.

1601.2 System Design. Rainwater catchment systems shall be designed in accordance with this chapter by a licensed plumbing contractor or registered design professional. Components, piping, and fittings used in a rainwater catchment system 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 360 gallons (1363 L). Rainwater catchment systems used for irrigation with a maximum storage capacity of 5000 gallons (18927 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 systems for single family dwellings where outlets, piping, and system components are located on the exterior of the building. Rainwater catchment systems for single family dwellings where all outlets, piping, and system components are located on the exterior of the building.

1601.3 Permit. It shall be unlawful for a person to construct, install, alter, or cause to be constructed, installed, or altered a rainwater catchment system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.

Exceptions:
(1) A permit is not required for exterior rainwater catchment systems used for outdoor drip and subsurface irrigation with a maximum storage capacity of 360 gallons (1363 L) 5000 gallons (18927 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 outlets, piping, and system components are located on the exterior of the building. This does not exempt the need for permits where required for electrical connections, tank supports, or enclosures.

1603.0 Design and Installation.

1603.3 Construction. Rainwater storage tanks shall be constructed of solid, durable materials not subject to excessive corrosion or decay and shall be watertight.

(renumber remaining sections)

1603.6 Rainwater Storage Tanks. Rainwater storage tanks shall be constructed and installed in accordance with Section 1603.3 and Section 1603.7 through Section 4603.14.

1603.7 Construction. Rainwater storage shall be constructed of solid, durable materials not subject to excessive corrosion or decay and shall be watertight. Storage tanks shall be approved by the Authority Having Jurisdiction, provided such tanks comply with approved applicable standards.

(renumber remaining sections)
1605.0 Inspection and Testing.
1605.1 General. Rainwater catchment systems shall be inspected and tested in accordance with Section 1605.2 and Section 1605.3. Irrigation systems not connected to a potable water system shall be exempt from testing requirements in Section 1605.3.

1605.3 Annual Cross-Connection Inspection and Testing. (remaining text unchanged)

1605.3.2 Cross-Connection Test. The procedure for determining cross-connection shall be followed by the applicant in the presence of the Authority Having Jurisdiction and other authorities having jurisdiction to determine whether a cross-connection has occurred as follows:
(1) – (2) (remaining text unchanged)
(3) Fixtures, potable, and rainwater shall be tested and inspected for flow. The drain on the rainwater catchment system shall be checked for flow during the test and all fixtures, potable and alternate water source, shall be tested and inspected for flow. Flow from a rainwater catchment water system outlet shall indicate a cross-connection. No flow from a potable water outlet shall indicate that it is connected to the rainwater system.
(4) The drain on the rainwater catchment water system shall be checked for flow during the test and at the end of the period.
(5) The potable water system shall then be depressurized and completely drained.
(6) – (409) (remaining text unchanged)

SUBSTANTIATION:
The proposed changes to Chapter 16 are updates to harmonize to the latest edition of the WeStand.

For Section 1601.2: 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 Section 1601.2 should be general to allow for the local experts from whatever field to be able to install the systems. The language being suggesting is consistent with the potable rainwater catchment systems. 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.

For Section 1601.3: 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.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The existing language should remain. Small systems are fine without having to be designed or have a permit. The maximum storage capacity of 360 gallons should remain. Systems of 5000 gallons require a permit as there is a concern with the size and structural design.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 23  NEGATIVE: 2  NOT RETURNED: 1  Daniels

EXPLANATION OF NEGATIVE:
BALLANCO: The proposed change would harmonize the code with WE-Stand. This change was properly substantiated and should have been accepted as submitted.

NIELSEN: I did not see any reason to reject it.

Appended Comments

318
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: 1601.2, 1601.3, 1603.3, 1603.6, 1603.7, 1605.1, 1605.3.2  Item #: 266

SUBMITTER: Jim Kendzel
American Supply Association
Rep. Chair, Alternate Water Sources Task Group

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
The proposed changes to Chapter 16 are updates to harmonize to the latest edition of the WeStand.
For Section 1601.2: 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 Section 1601.2 should be general to allow for the local experts from whatever field to be able to install the systems. The language being suggesting is consistent with the potable rainwater catchment systems. 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.

For Section 1601.3: 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.
Proposals

Item #: 270
UPC 2024  Section: A 104.1

SUBMITTER: Domenico Barbato
City of Los Angeles

RECOMMENDATION:
Revise text

A 104.0 Permissible Friction Loss.
A 104.1 Residual Pressure. Decide what is the desirable minimum residual pressure that shall be maintained at the highest fixture in the supply system. Where the highest group of fixtures contains flushometer valves, the available residual pressure for the group shall be not less than 15 pounds-force per square inch (psi) (103 kPa). For flush tank supplies, the available residual pressure shall be not less than 8 psi (55 kPa).

SUBSTANTIATION:
The current verbiage is in conflict with Section 608.1 of the UPC which requires a minimum residual pressure of 15 psi regardless of the type of flushing device. This amendment reconciles the two sections.

COMMITTEE ACTION: ACCEPT AS SUBMITTED
TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1
Code Year: 2024 UPC  Section #: A 104.1, 608.1
SUBMITTER: Armando Barragan
Self

RECOMMENDATION:
Revise text

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

A 104.0 Permissible Friction Loss.
A 104.1 Residual Pressure. Decide what is the desirable minimum residual pressure that shall be maintained at the highest fixture in the supply system. Where the highest group of fixtures contains flushometer valves, the available residual pressure for the group shall be not less than 15 pounds-force per square inch (psi) (103 kPa). The available residual pressure for flush tank supplies shall be not less than 8 psi (55 kPa). The residual pressure for blowout fixtures shall be not less than 25 psi (172.4 kPa). Where fixtures, fixture fittings, or both are installed that require a higher residual pressure, that minimum residual pressure shall be provided.

608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.
608.1 Inadequate Water Pressure. Where the water pressure in the main or other source of supply will not provide a residual water pressure of not less than 15 pounds force per square inch (psi) (103 kPa), after allowing for friction and other pressure losses, a tank and a pump or other means that will provide said 15 psi (103 kPa) pressure shall be
The available residual pressure for flush tank supplies shall be not less than 8 psi (55 kPa). The residual pressure for blowout fixtures shall be not less than 25 psi (172.4 kPa). Where fixtures, fixture fittings, or both are installed that require a higher residual pressure exceeding 15 psi (103 kPa), that minimum residual pressure shall be provided.

**SUBSTANTIATION:**
The change has good intention; however, it is overly restricted by requiring not less than 15 psi for all fixtures as there are fixtures that can perform at 8 psi or more; such as flush tanks valves. Additionally, there are other fixtures that require a higher pressure, such as blowout fixtures. These fixtures are necessary and used in commercial, industrial, and institutional facilities which is mentioned in Table 422.1 under Occupancy Type I-1, I-2, I-3, and I-4.

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**PUBLIC COMMENT 2**

**Code Year:** 2024 UPC  
**Section #:** A 104.1, 608.1  
**Item #:** 270

**SUBMITTER:** Armando Barragan  
Self

**RECOMMENDATION:**
Revise text

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

**A 104.0 Permissible Friction Loss.**

**A 104.1 Residual Pressure.** Decide what is the desirable minimum residual pressure that shall be maintained at the highest fixture in the supply system. The available residual pressure shall be not less than 15 pounds-force per square inch (psi) (103 kPa). Where fixtures, fixture fittings, or both are installed that require a residual pressure exceeding 15 psi (103 kPa), that minimum residual pressure shall be provided.

**608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.**

**608.1 Inadequate Water Pressure.** Where the water pressure in the main or other source of supply will not provide a residual water pressure of not less than 15 pounds force per square inch (psi) (103 kPa), after allowing for friction and other pressure losses, a tank and a pump or other means that will provide said 15 psi (103 kPa) pressure shall be installed. Where fixtures, fixture fittings, or both are installed that require a residual pressure exceeding 15 psi (103 kPa), that minimum residual pressure shall be provided.

**SUBSTANTIATION:**
The original change has good intentions; however, it still needs additional language to correlate with Section 608.1. This change is needed as there are fixtures which require additional pressures such as "blowout water closets" which are used in certain circumstances, such as in institutional facilities.
Proposals

Item #: 271
UPC 2024  Section: B 101.2

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

B 101.0 General.

B 101.2 General Requirements. Combination waste and vent systems, *(which at best are merely an expedient designed to be used in locations where it would be structurally impractical to provide continuous venting of fixtures)* as outlined in Section 910.0 of this code, cover the horizontal wet venting of a series of traps using a common waste and vent pipe. Pipe sizes not less than two pipe sizes larger than those required for a conventional system are designed to maintain a wetted perimeter or flow line low enough in the waste pipe to allow adequate air movement in the upper portion, thus balancing the system. Sinks, lavatories, and other fixtures that rough in above the floor, shall not be permitted on a combination waste and vent system, *which, at best, is merely an expedient designed to be used in locations where it would be structurally impractical to provide venting in a conventional manner.*

Combination waste and vent systems are intended primarily for extensive floor or shower drain installations where separate venting is not practical, for floor sinks in markets, demonstration or work tables in school buildings, or for similar applications where the fixtures are not adjacent to walls or partitions. Due to its oversize characteristics, such a waste system is not self-scouring and, consequently, care shall be exercised as to the type of fixtures connected to it and the location of cleanouts. Given its grease-producing potential, restaurant kitchen equipment shall not be connected to a combination waste and vent system.

SUBSTANTIATION:
This is an editorial change that clarifies the intent of Appendix B. Relocating the exiting language to the beginning will clarify the general requirements.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

EXPLANATION OF AFFIRMATIVE:

WHITE: The substantiation is correct, it is an editorial change relocating an editorial statement. Editorial statements have no place in the code to start with.

Appended Comments
910.0 Combination Waste and Vent Systems.

910.7 Fixtures. No water closet or urinal shall be installed on such a system. Other one, or two, or three unit fixtures remotely located not less than 10 feet (3048 mm) from the sanitary system and adjacent to not more than 8 feet (2438 mm) from a combination waste and vent system shall be permitted to be connected to such system in the conventional manner by means of waste and vent pipes of regular sizes, providing that the two pipe size increase required in Section 910.4 is based on the total fixture unit load connected to the system.

See Appendix B of this code for explanatory notes on the design of combination waste and vent systems.

B 101.0 General.

B 101.2 General Requirements. Combination waste and vent systems, (which at best are merely an expedient designed to be used in locations where it would be structurally impractical to provide continuous venting of fixtures) as outlined in Section 910.0 of this code, cover the horizontal wet venting of a series of traps using a common waste and vent pipe. Pipe sizes not less than two pipe sizes larger than those required for a conventional system are designed to maintain a wetted perimeter or flow line low enough in the waste pipe to allow adequate air movement in the upper portion, thus balancing the system. Sinks, lavatories, and other One and two unit fixtures that rough in above the floor, shall not be permitted to connect to a combination waste and vent system when located as required in Section 910.7.

Combination waste and vent systems are intended primarily for extensive floor or shower drain installations where separate venting is not practical, for floor sinks in markets, demonstration or work tables in school buildings, or for similar applications where the fixtures are not adjacent to walls or partitions. Due to its oversize characteristics, such a waste system is not self-scouring and, consequently, care shall be exercised as to the type of fixtures connected to it and the location of cleanouts. Given its grease-producing potential, restaurant kitchen equipment shall not be connected to a combination waste and vent system.

SUBSTANTIATION:
Currently, there is a conflict between Section 910.7 and Appendix B, Section B 101.2. This proposal allows an option of having low discharge fixtures that rough in above the floor to connect to a combination waste and vent system under certain conditions harmonizing the 2 sections.

PUBLIC COMMENT 2

910.0 Combination Waste and Vent Systems.

910.7 Fixtures. No water closet, or urinal or fixtures that rough in above the floor shall be installed on such a system. Other one, two, or three unit fixtures remotely located from the sanitary system and adjacent to a combination waste and vent system shall be permitted to be connected to such system in the conventional manner by means of waste and vent pipes of regular sizes, providing that the two pipe size increase required in Section 910.4 is based on the total fixture unit load connected to the system.

See Appendix B of this code for explanatory notes on the design of combination waste and vent systems.
B 101.0 General.

B 101.2 General Requirements. Combination waste and vent systems, (which at best are merely an expedient designed to be used in locations where it would be structurally impractical to provide continuous venting of fixtures) as outlined in Section 910.0 of this code, cover the horizontal wet venting of a series of traps using a common waste and vent pipe. Pipe sizes not less than two pipe sizes larger than those required for a conventional system are designed to maintain a wetted perimeter or flow line low enough in the waste pipe to allow adequate air movement in the upper portion, thus balancing the system. Sinks, lavatories, and other fixtures that rough in above the floor, shall not be permitted on a combination waste and vent system.

Combination waste and vent systems are intended primarily for extensive floor or shower drain installations where separate venting is not practical, for floor sinks in markets, demonstration or work tables in school buildings, or for similar applications where the fixtures are not adjacent to walls or partitions. Due to its oversize characteristics, such a waste system is not self-scouring and, consequently, care shall be exercised as to the type of fixtures connected to it and the location of cleanouts. Given its grease-producing potential, restaurant kitchen equipment shall not be connected to a combination waste and vent system.

SUBSTANTIATION:
Currently, there is a conflict between Section 910.7 and Appendix B, Section B 101.2. This proposal eliminates the option of having fixtures that rough in above the floor from connecting to a combination waste and vent system harmonizing the 2 sections.
Proposals

Item #: 278
UPC 2024  Section: H 301.1(6)

SUBMITTER: David Lentz
Infiltrator Water Technologies

RECOMMENDATION:
Revise text

H 301.0 Area of Disposal Fields and Seepage Pits.
H 301.1 General. The minimum effective absorption area in disposal fields in square feet \( (m^2) \), and in seepage pits in square feet \( (m^2) \) of sidewall, shall be predicated on the required septic tank capacity of gallons (liters), estimated waste/sewage flow rate, or whichever is greater, and shall be in accordance with Table H 201.1(2) as determined by the type of soil found in the excavation, and shall be as follows:

(1) (remaining text unchanged)
(2) Where leaching beds are permitted instead of trenches, the area of each such bed shall be not less than 50 percent greater than the tabular requirements for trenches. Perimeter sidewall area more than the required 12 inches (305 mm) and not exceeding 36 inches (914 mm) below the leach line shall be permitted to be added to the trench bottom area where computing absorption areas.
(3) – (5) (remaining text unchanged)
(6) Systems that combine treatment and disposal of sewage within a single footprint and comply with NSF 40 shall be sized using a 0.70 multiplier applied to the required area in Table H 201.1(2) for both leach lines and leach beds. No system component for a combined treatment and disposal leach line or leach bed shall be located within 2 feet (610 mm) of the water table nor to a depth where sewage is capable of contaminating the underground water stratum that is usable for domestic purposes. Combined treatment and disposal system operation and maintenance shall be in accordance with the manufacturer's instructions.

Exception: Combined treatment and disposal systems tested and certified in a bed configuration in accordance with NSF 40 are exempted from the requirements of Section H 301.1(2).

(remaining text unchanged)

TABLE H 201.1(2)
DESIGN CRITERIA OF FIVE TYPICAL SOILS

<table>
<thead>
<tr>
<th>TYPE OF SOIL</th>
<th>REQUIRED SQUARE FEET OF LEACHING AREA PER 100 GALLONS</th>
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<tbody>
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<td>Coarse sand or gravel</td>
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</tr>
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<td>120</td>
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</tr>
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</table>

For SI units: 1 square foot = 0.0929 \( m^2 \), 1 gallon = 3.785 L, 1 gallon per square foot = 40.7 L/m\(^2\)
Since 2014, IAPMO has partnered with the United States Environmental Protection Agency (USEPA) as one of 14 collaborators operating under a Memorandum of Understanding (MOU) and aspiring to improve the overall performance and management of decentralized wastewater treatment systems (2020 IAPMO MOU announcement - see Attachment 1 of Supporting Document). Appendix H – Private Sewage Disposal Systems describes decentralized wastewater treatment systems and applies directly to the USEPA MOU. The proposed addition to Subsection H 301.1 recognizes the use of systems proven through an industry-recognized ANSI standard to be capable of treating and disposing of sewage in a single footprint. This class of wastewater treatment technology, referred to as combined treatment and dispersal (CTD), has been in use across the North America for over 25 years, with installations surging in the past 10 years as wastewater industry stakeholders seek reliable, sustainable, non-electric, low-impact means of treating and dispersing wastewater. CTD has transitioned to a major element of the wastewater treatment system framework in several states and Canadian provinces, including Connecticut, Indiana, Maine, Massachusetts, New Hampshire, New York, Ohio, Ontario, Quebec, and Rhode Island.

Multiple manufacturers have certified CTD systems under NSF 40-2018 - Residential Wastewater Treatment Systems. NSF 40 establishes minimum materials, design and construction, and performance requirements for residential wastewater treatment systems. Technologies in the marketplace include a proprietary device installed within a specified coarse-grained sand, most often sand conforming with ASTM C33 particle size gradation requirements. Septic tank effluent enters the proprietary CTD device, where distribution and filtering occur, followed by additional treatment in the surrounding specified sand, resulting in a treated effluent conforming with the NSF 40 biochemical oxygen demand concentration of 25 milligrams per liter (mg/l) and total suspended solids concentration of 30 mg/l conformance criteria. Extensive third-party testing of CTD systems to NSF 40 has shown that these non-mechanical, sand based systems meet the water quality criteria in the standard immediately upon start up. In contrast, electro-mechanical systems characteristically need the allotted 21-day grace period to achieve compliance, as allowed in NSF 40, while a microflora population capable of meeting treatment requirements develops. This capability of providing immediate performance shows that, beyond continuous-use applications, CTD systems are ideal for intermittent and inconsistent flow usage conditions, such as that which occurs with seasonal dwellings.

CTD processes occur without the need for electricity, using natural biological and chemical processes to provide wastewater meeting secondary treatment standards. Rather than discharging primary-treated wastewater to native soil like a pipe and filter material disposal field or seepage pits described in Section H 301, CTD systems disperse secondary-treated effluent to the native soil, providing a tangible environmental benefit that is required for certain building sites by Authorities Having Jurisdiction across the nation. For this reason, the minimum 5-foot separation beneath the disposal field or seepage pit described in Section H 301.1(3) is established as 2 feet, aligning with the separation distance established in Section 9.4.8 of the California State Water Resources Control Board’s 2012 Onsite Wastewater Treatment Systems Policy, which states: “Separation of the bottom of dispersal system to groundwater less than two (2) feet, except for seepage pits, which shall not be less than 10 feet.” (See Attachment 2 of Supporting Document).

Similar to gravelless chamber and bundled expanded polystyrene unit disposal field sizing in Section H 301.1(5), gravelless CTD disposal field sizing corresponds to a 0.70 multiplier on the area required in Table H 201.1(2). The absence of gravel fines, combined with secondary treated effluent, warrants sizing of CTD systems as gravelless systems. Gravelless technology sizing at a 0.70 multiplier has been in the UPC for over twenty years, is well-established through third-party studies, and is accepted broadly by Authority Having Jurisdiction around the U.S. and Canada. Over 50% of residential decentralized wastewater treatment systems installed in North America last year incorporated gravelless technologies for effluent disposal. Mined, processed, and washed gravel used as a pipe and filter material disposal system has become the minority of installed disposal systems.

Supporting document(s) has been provided to the Technical Committee for review.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
There was not technical justification provided as to why Section H 301.1(2) is being exempted. The term "water stratum" is not clear and needs clarification.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels
H 301.0 Area of Disposal Fields and Seepage Pits.

H 301.1 General. The minimum effective absorption area in disposal fields in square feet (m²), and in seepage pits in square feet (m²) of sidewall, shall be predicated on the required septic tank capacity of gallons (liters), estimated waste/sewage flow rate, or whichever is greater, and shall be in accordance with Table H 201.1(2) as determined by the type of soil found in the excavation, and shall be as follows:

(1) (remaining text unchanged)
(2) Where leaching beds are permitted instead of trenches, the area of each such bed shall be not less than 50 percent greater than the tabular requirements for trenches. Perimeter sidewall area more than the required 12 inches (305 mm) and not exceeding 36 inches (914 mm) below the leach line shall be permitted to be added to the trench bottom area where computing absorption areas.
(3) No excavation for a leach line or leach bed shall be located within 5 feet (1524 mm) of the water table nor to a depth where sewage is capable of contaminating the underground water stratum that is usable for domestic purposes.

Exception: In areas where the records or data indicate that the groundwaters are grossly degraded, the 5 foot (1524 mm) separation requirement shall be permitted to be reduced by the Authority Having Jurisdiction. The applicant shall supply evidence of groundwaters depth to the satisfaction of the Authority Having Jurisdiction.

(4) The minimum effective absorption area in any seepage pit shall be calculated as the excavated sidewall area below the inlet exclusive of any hardpan, rock, clay, or other impervious formations. The minimum required area of porous formation shall be provided in one or more seepage pits. No excavation shall extend within 10 feet (3048 mm) of the water table nor to a depth where sewage is capable of contaminating underground water stratum that is usable for domestic purposes.

Exception: In areas where the records or data indicate that the groundwaters are grossly degraded, the 10 foot (3048 mm) separation requirement shall be permitted to be reduced by the Authority Having Jurisdiction. The applicant shall supply evidence of groundwaters depth to the satisfaction of the Authority Having Jurisdiction.

(5) Leaching chambers that comply with IAPMO PS 63 and bundled expanded polystyrene synthetic aggregate units that comply with IAPMO IGC 276 shall be sized using a 0.70 multiplier applied to the required area in Table H 201.1(2).

(6) Systems that combine treatment and disposal of sewage within a single footprint and comply with NSF 40 shall be sized using a 0.70 multiplier applied to the required area in Table H 201.1(2) for both leach lines and leach beds. No system component for a combined treatment and disposal leach line or leach bed shall be located within 2 feet (610 mm) of the water table nor to a depth where sewage is capable of contaminating the underground water stratum that is usable for domestic purposes. Combined treatment and disposal system operation and maintenance shall be in accordance with the manufacturer's instructions.

Exception: Combined treatment and disposal systems tested and certified in a bed configuration in accordance with NSF 40 are exempted from the requirements of Section H 301.1(2).

(below shown for reference only)

### TABLE H 201.1(2)

**DESIGN CRITERIA OF FIVE TYPICAL SOILS**

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For SI units: 1 square foot = 0.0929 m², 1 gallon = 3.785 L, 1 gallon per square foot = 40.7 L/m²

**SUBSTANTIATION:**

**David Lentz:**

Item #278 should be incorporated into the UPC as originally proposed for the reasons cited below.

Combined treatment and disposal systems use gravity flow of septic tank effluent and a combination of media and soil to achieve secondary wastewater treatment criteria without the use of electricity. This system returns treated water to the underground environment, is resilient relative to loss of power, changing climate, and natural events such as wildfires. At present, the UPC describes 5 system types for disposing of septic tank effluent, including filter media and pipe, seepage pits, cesspools, leaching chambers, and bundled expanded polystyrene synthetic aggregate. The proposal in #278 adds a sixth means of wastewater disposal to the UPC, expanding the technological choices furnished to the septic system design community.

This proposal solves a problem in four ways: 1) it provides a framework for health departments to regulate a sixth wastewater system technology; 2) it expands the tools septic system designers have available for designing the disposal area; 3) this proposal represents a design option, not a requirement; and 4) it describes a system capable of providing secondary treatment of domestic wastewater, thereby promoting environmental stewardship and recharging aquifers at a time when water suppliers are under tremendous pressure to serve the needs of the public.

The Technical Committee had two concerns in the Report on Proposals, as described below.

**Concern 1** - The first was about technical justification for Section H 301.1(2) being exempted. Section H 301.1(2) requires that a conventional gravel and pipe leaching bed system be increased in size by 50% compared to a gravel and pipe trench system. Item #278 exempts combined treatment and disposal systems from this up sizing only when the system has been both tested in a bed configuration and demonstrated to conform with the consensus standard NSF 40-2018. When a CTD system design has been proven to achieve secondary treatment standards in a bed configuration through third-party testing and certification, increasing the footprint is not warranted. CTD systems that have not been tested and demonstrated to comply with NSF 40-2018 are ineligible for the exemption and would require increased sizing by at least 50 percent.

**Concern 2** - The Technical Committee’s second concern is the use of the term “water stratum,” which was not clear and in need of clarification. The term “water stratum” is presently utilized two times in Appendix H – once in subsection H 301.1(3) and again in subsection H 301.1(4). In both cases “water stratum” refers to naturally occurring groundwater in the native soil. This is exactly what is described in item #278. The term “Water stratum” was selected precisely because its use aligns with current UPC language, has been previously vetted by the UPC Technical Committee as an acceptable term, and will provide consistency and clarity within the UPC.

**Robert Crandall:**

My name is Robert (Bob) Crandall. I retired from the State of California in 2013 from the position of Assistant Executive Officer for the Central Valley Regional Water Quality Control Board (CVRWQCB). As the largest Regional Board in the State Water Boards system with extensive rural areas, the potential impacts to water quality from septic systems was and remains a major concern for the CVRWQCB.

I am providing written comments as follow-up to my verbal comments to the International Association of Plumbing and Mechanical Officials (IAPMO) September 28, 2021 meeting concerning revisions to the Uniform Plumbing Code (UPC). I am writing in support of the Infiltrator Water Technologies (IWT) proposal to include Combined Treatment and Dispersal (CTD) systems in Section H 301.1 of the UPC in accordance with the following language:

“(6) Systems that combine treatment and disposal of sewage within a single footprint and comply with NSF 40-2018 shall be sized using a 0.70 multiplier applied to the required area in Table H 201.1(2) for both leach lines and leach beds. No system component for a combined treatment and disposal leach line or leach bed shall be located within 2 feet (610 mm) of the water table nor to a depth where sewage is capable of contaminating the underground water stratum that is usable for domestic purposes. Combined treatment and disposal system operation and maintenance shall be in accordance with the manufacturer's instructions.
Exception: Combined treatment and disposal systems tested and certified in a bed configuration in accordance with NSF 40-2018 are exempted from the requirements of Section H 301.1(2).”

After my retirement, a former mentor and friend introduced me to the Presby Environmental Advanced Enviro-Septic (AES) passive Combined Treatment and Dispersal system. I was attracted to this innovative technology due to its simplicity, greatly reduced maintenance requirements, high level of treatment performance, and greatly reduced cost (compared to mechanical treatment systems). Thus, I introduced the product into California where it has been very successful in residential, commercial, and small community applications including a 100,000 GPD system that served approximately 1500 FEMA workers who conducted the cleanup of the Town of Paradise after the wildfires. I currently provide part-time consulting services to IWT who acquired Presby in April 2019.

I strongly support the proposed revision to the UPC because it will encourage the use of septic systems with treatment in order to much greater protect water quality, public health, and the environment. CTD systems, like the AES or others which meet the treatment standards of NSF 40, provide the important benefit of a reduced footprint while still achieving effective and safe dispersal of the treated effluent. A reduced footprint is important, especially in California where the cost of real estate is high and adequate property space may be limited. A smaller footprint not only reduces cost, it also better allows compliance with required setbacks (e.g. to wells, streams, property lines, buildings, etc.).

A reduced footprint for CTD systems meeting the NSF 40 standard is reasonable and justifiable based upon the high level of treatment. Conventional pipe and stone leach fields disperse untreated sewerage whereby the native soils are relied upon to treat the contaminants in the wastewater. Over time, the biological activity that takes place in the soils with conventional systems will eventually clog the soils and cause them to fail. For this reason, standards for the design and construction of conventional systems provide substantial dispersal area coverage.

On the other hand, CTD systems meeting NSF 40 treatment standards produce wastewater effluent quality with exceedingly low levels of organic contaminants so that native soils are not significantly impacted thereby greatly reducing the potential of long-term clogging and failure. Treatment prior to dispersal allows the native soils to effectively absorb and percolate the wastewater almost like rainwater. The dispersal of highly treated wastewater effluent not only protects the native soils, it protects the underlying groundwater.

Additionally, CTD systems such as the AES (and other competitive products) do not use electrical, mechanical, moving parts or require chemicals or periodic cleaning of components which greatly simplifies operation and maintenance of the system for homeowners, commercial applications, and small communities. In my experience as a regulator, virtually all problems with wastewater systems that trigger enforcement actions are the result of electrical/mechanical equipment failure or operator error/inadequate maintenance. Passive CTD systems greatly reduce, if not eliminate, these problems.

A dispersal area for a CTD system that is equivalent or larger than for a conventional system is not only unnecessary, it is counterproductive for protecting water quality, public health, and the environment. From a regulatory and public health perspective, we want to see discharge standards raised and doing so requires treatment. The passive CTD systems are also more affordable which encourages homeowners and others to install treatment. By not acknowledging the benefit of a smaller footprint with CTD systems, we are effectively subsidizing conventional systems which discharge untreated water and pose threats to water quality, public health, and the environment and discouraging the use of treatment to raise standards. Codes and regulations which properly account for benefits of innovative technologies such as CTD systems are extremely important for improving performance at an affordable cost.

For all the reasons above, I strongly recommend and support IWT’s proposed revisions to the UPC and I hope that IAPMO will adopt and incorporate them as soon as feasibly possible.

Derek DeLand:
The UPC Technical Committee (TC) is encouraged to reverse its previous decision to reject Proposal Item #278 and to accept Item #278 as submitted.

Gravelless onsite sewage disposal technology is already acceptable under Annex H of the UPC. The incorporation of NSF/ANSI 40 certified CTD systems into the UPC simply adds another option for design engineers and regulators to exercise, particularly where passive secondary treatment is of public health interest. This proposal does not represent a new requirement or hurdle for manufacturers or installers to overcome.
The UPC TC rejected Item #278 citing two concerns. First, that there was no technical justification for the proposed exemption to H 301.1(2) which requires upsizing for leaching beds. Item #278 specifically mentions only NSF/ANSI 40 certified CTD systems tested in a bed configuration are covered by the exception. Therefore, since the CTD systems are already tested and certified as bed designs/configurations, exempting them from the size stipulations for beds under H 301.1(2) would be appropriate. Any other configurations do not apply to the proposed exception.

The other concern raised by the TC was around the term “water stratum.” This term was taken from existing UPC text under H 301.1(3) for consistency purposes and therefore it seems inappropriate to reject Item #278 for using existing UPC terms based on a lack of clarity. Additionally, to require the submitter to clarify an existing UPC term could create unforeseen issues as it may lead to a definition or meaning that is not consistent with the original intent.

Abraham I. Murra:
At the meeting on September 28, the Assembly heard technical arguments from engineers, regulators, designers, users, testing engineers, and manufacturers—with significant experience in the wastewater treatment industry—comprehensively addressing the concerns expressed by the UPC TC for rejecting Item # 278 and supporting the approval of the proposal as submitted. The Assembly determined that the supporting arguments satisfactorily addressed the UPC TC concerns and recommended changing the action on the proposal to “accept as submitted.” This comment is in support of the Assembly’s decision and a request for the UPC TC to formally “accept as submitted” Item # 278.

William E. Evans:
Item #278 should be incorporated into the UPC as originally proposed for the reasons cited below.

I was the administrator of the regulating authority for the State of New Hampshire from 1981 to 2009. During this time period, there were approximately 80,000 combined treatment and dispersal (CTD) systems installed in New Hampshire. It has been my experience that when properly installed, CTD systems have an extremely low failure rate (less than 1%) and, even after as much as 14 years in service, these systems continued to work as expected with only minimal required maintenance. Since my retirement in 2009 I have heard only good reports on the performance of these systems. These systems have consistently performed with a very high degree of reliability and have demonstrated superior durability and longevity.

Lance Bates:
I see increased usage of CTD technology in the field by septic system installers, so adding it to the Code is appropriate so industry has a common point of reference for the design and construction of the technology.

Demand is increasing for CTD systems each year.

I have personally witnessed the success these systems have delivered for homeowners.

CTD technology is passive, requiring no electricity and resilient to weather and other conditions that can upset other types of wastewater systems.

My experience is that CTD technology provides excellent hydraulic function while providing secondary treatment of wastewater.

Adding CTD technology to the Code helps solve a problem of providing a uniform set of regulatory requires for California counties to use in administering this technology.

This proposal solves multiple problems: 1) it provides a framework for health departments to regulate a sixth wastewater system technology; 2) it expands the tools septic system designers have available for designing the disposal area; and 3) this proposal represents a design option, not a requirement.

The proposal should move forward as proposed because it describes a system capable of providing secondary treatment of domestic wastewater, thereby promoting environmental stewardship and recharging aquifers at a time when water suppliers are under tremendous pressure to serve the needs of the public. As a Californian, I support the increased usage of such systems for drought-stricken areas across the Western United States.
Proposals

Item #: 280

UPC 2024 Section: H 501.14, Table 1701.1

SUBMITTER: David Lentz
Infiltrator Water Technologies

RECOMMENDATION:
Revise text

H 501.0 Septic Tank Construction.

H 501.14 Prefabricated Septic Tanks. Prefabricated septic tanks shall comply with the following requirements:
(1) Manufactured or prefabricated septic tanks shall comply with approved applicable standards and be approved by the Authority Having Jurisdiction.
(2) Prefabricated bituminous coated septic tanks shall comply with UL 70.
(3) Prefabricated thermoplastic tanks having a total liquid volume less than 750 gallons (2389 L) shall comply with IAPMO IGC 262.
(4) Independent laboratory tests and engineering calculations certifying the tank capacity and structural stability shall be provided as required by the Authority Having Jurisdiction.

TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

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<td>DWV Components</td>
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(Portions of table not shown remain unchanged)

SUBSTANTIATION:
The proposed change adds the appropriate standard for manufactured or prefabricated corrugated thermoplastic tanks having a total liquid volume less than 750 gallons in pumping and holding applications. The current language does not provide a specific reference standard. However, a standard is available to define requirements for manufactured or prefabricated septic tanks used for pumping and holding applications to ensure the tanks are safe for use in its application. This section of the code already specifies UL 70 for bituminous coated septic tanks, so the inclusion of IAPMO IGC 262-2020 for corrugated thermoplastic tanks would be a parallel addition to the existing code structure. In adding IAPMO IGC 262-2020, the proposal includes separating the UL 70 bituminous coated tank requirements into a new subsection, so that differing technical specifications are presented clearly and independently.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
This proposed change is overly restrictive regarding a maximum volume of 750 gallons and conflicts with the IAPMO IGC 262 standard. The standard does not provide a maximum volume, only a minimum volume of 300 gallons.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels
PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: H 501.14(1)  Item #: 280

SUBMITTER: David Lentz
Infiltrator Water Technologies
Comment #: 1

RECOMMENDATION:
Revise text

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

H 501.0 Septic Tank Construction.

H 501.14 Prefabricated Septic Tanks. Prefabricated septic tanks shall comply with the following requirements:
(1) Manufactured or prefabricated septic tanks shall comply with IAPMO/ANSI Z1000, IAPMO IGC 262, or CSA B66 and be approved by the Authority Having Jurisdiction. Prefabricated bituminous coated septic tanks shall comply with UL 70.
(2) Independent laboratory tests and engineering calculations certifying the tank capacity and structural stability shall be provided as required by the Authority Having Jurisdiction.

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SUBSTANTIATION:
The proposed change takes into consideration the addition of the IAPMO/ANSI Z1000 and CSA B66 standards via Item #279, by incorporating an additional standard for manufactured or prefabricated corrugated thermoplastic tanks in pumping and holding applications. The current language does not provide a specific reference standard for manufactured or prefabricated corrugated thermoplastic tanks in pumping and holding applications. However, with a standard available to define such requirements, it should be made available to Code users. This section of the Code currently specifies UL 70 for bituminous coated septic tanks, so the inclusion of IAPMO IGC 262-2020 for corrugated thermoplastic tanks would be a parallel addition to the existing Code structure, providing a means for broadening designer and consumer options for tanks specified in private sewage disposal systems.
H 601.2 Filter Material. Before placing filter material or drain lines in a prepared excavation, smeared or compacted surfaces shall be removed from trenches by raking to a depth of 1 inch (25.4 mm) and the loose material removed. Clean stone, gravel, slag, or similar filter material acceptable to the Authority Having Jurisdiction, varying in size from ¾ of an inch to 2 ½ inches (19.1 mm to 64 mm), shall be placed in the trench to the depth and grade required by this section. Drain pipe shall be placed on filter material in an approved manner. The drain lines shall then be covered with filter material to the minimum depth required by this section, and this material covered with untreated building paper, straw, or similar porous material to prevent the closure of voids with earth backfill. No earth backfill shall be placed over the filter material cover until after inspection and acceptance.

Exception: Listed or approved plastic leaching chambers, and bundled expanded polystyrene synthetic aggregate units, and systems that treat and dispose of sewage within a single footprint shall be permitted to be used in lieu of pipe and filter material. Chamber, and bundled expanded polystyrene synthetic aggregate unit, and systems that treat and dispose of sewage within a single footprint installations shall follow the rules for disposal fields, where applicable, and shall be in accordance with the manufacturer's instructions.

SUBSTANTIATION:
This proposal is associated with a separate proposal to add combined treatment and dispersal (CTD) private sewage systems to Section H 301.1. The separate Section H 301.1 proposal expands the gravelless effluent disposal technology described in the code, adding to the current description of plastic leaching chambers and bundled expanded polystyrene synthetic aggregate units described in Section H 301.1(5). The change to the Section H 601.2 exception is proposed in order to maintain consistency with the manner in which similar effluent disposal technologies are addressed in the code, where these technologies collectively represent recognized substitute media for a pipe and filter material trench or bed (see Section H 301.0 for pipe and filter material description).

Since 2014, IAPMO has partnered with the United States Environmental Protection Agency (USEPA) as one of 14 collaborators operating under a Memorandum of Understanding (MOU) and aspiring to improve the overall performance and management of decentralized wastewater treatment systems (see Supporting Document - IAPMO WE•Stand Newswire 2020 IAPMO MOU announcement). Appendix H – Private Sewage Disposal Systems describes decentralized wastewater treatment systems and applies directly to the USEPA MOU. The proposed addition to Subsection H 601.2 recognizes the use of systems proven through an industry-recognized ANSI standard to be capable of treating and disposing of sewage in a single footprint. This class of wastewater treatment technology, referred to as CTD, has been in use across the North America for over 25 years, with installations surging in the past 10 years as wastewater industry stakeholders seek reliable, sustainable, non-electric, low-impact means of treating and dispersing wastewater. CTD has transitioned to a major element of the wastewater treatment system framework in several states and Canadian provinces, including Connecticut, Indiana, Maine, Massachusetts, New Hampshire, New York, Ohio, Ontario, Quebec, and Rhode Island.
Multiple manufacturers have certified CTD systems under NSF 40-2018 - Residential Wastewater Treatment Systems. NSF 40-2018 establishes minimum materials, design and construction, and performance requirements for residential wastewater treatment systems. Technologies in the marketplace include a proprietary device installed within a specified coarse-grained sand, most often sand conforming with ASTM C33 particle size gradation requirements. Septic tank effluent enters the proprietary CTD device, where distribution and filtering occur, followed by additional treatment in the surrounding specified sand, resulting in a treated effluent conforming with the NSF 40-2018 biochemical oxygen demand concentration of 25 milligrams per liter (mg/l) and total suspended solids concentration of 30 mg/l conformance criteria. Extensive third-party testing of CTD systems to NSF 40 has shown that these non-mechanical, sand based systems meet the water quality criteria in the standard immediately upon start up. In contrast, electro-mechanical systems characteristically need the allotted 21-day grace period to achieve compliance, as allowed in NSF 40-2018, while a microflora population capable of meeting treatment requirements develops. This capability of providing immediate performance shows that, beyond continuous-use applications, CTD systems are ideal for intermittent and inconsistent flow usage conditions, such as that which occurs with seasonal dwellings.

CTD processes occur without the need for electricity, using natural biological and chemical processes to provide wastewater meeting secondary treatment standards. Rather than discharging primary-treated wastewater to native soil like a pipe and filter material disposal field or seepage pits described in Section H 301, CTD systems disperse secondary-treated effluent to the native soil, providing a tangible environmental benefit that is required for certain building sites by Authorities Having Jurisdiction across the nation.

Supporting document(s) has been provided to the Technical Committee for review.

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**
The language is vague and not enforceable. The statement "treat and dispose of sewage within a single footprint" gives no direction to the end user. This will be consistent with the actions taken on Item # 278.

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

**Appended Comments**

**PUBLIC COMMENT 1:** (Assembly Action)

**Code Year:** 2024 **UPC Section #:** H 601.2 **Item #:** 282

**SUBMITTER:** David Lentz (Infiltrator Water Technologies); Derek DeLand (NSF International); Abraham I. Murra (Abraham Murra Consulting); Lance Bates (NexGen Septics LLC, Rep. Infiltrator and Eljen)

**RECOMMENDATION:**
Revise text

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

**H 601.0 Disposal Fields.**

**H 601.2 Filter Material.** Before placing filter material or drain lines in a prepared excavation, smeared or compacted surfaces shall be removed from trenches by raking to a depth of 1 inch (25.4 mm) and the loose material removed. Clean stone, gravel, slag, or similar filter material acceptable to the Authority Having Jurisdiction, varying in size from 3/4 of an inch to 2-1/2 inches (19.1 mm to 64 mm), shall be placed in the trench to the depth and grade required by this section. Drainpipe shall be placed on filter material in an approved manner. The drain lines shall then be covered with filter material to the minimum depth required by this section, and this material covered with untreated building paper, straw, or similar porous material to prevent the closure of voids with earth backfill. No earth backfill shall be placed over the filter material cover until after inspection and acceptance.

**Exception:** Listed or approved plastic leaching chambers, and bundled expanded polystyrene synthetic aggregate units, and systems that treat and dispose of sewage within a single footprint, as described in Section H 301.1(5) and Section H 301.1(6), shall be permitted to be used in lieu of pipe and filter material. Chamber, and bundled expanded polystyrene synthetic aggregate unit, and systems that treat and dispose of sewage within a single footprint, installations
shall follow the rules for disposal fields, where applicable, and shall be in accordance with the manufacturer’s instructions.

**SUBSTANTIATION:**

**David Lentz:**
Item #282 is a change that would be required in conjunction with new language proposed under item #278.

The Technical Committee indicated that Item #282 “vague and not enforceable,” with the statement “treat and dispose of sewage within a single footprint” providing “no direction to the end user.”

The exception in Section H 601.2 currently allows the substitution of two types of disposal systems for a conventional gravel and pipe system. This exception language has been in the UPC since at least the 2000 edition of the Code.

Item #282 simply added the combined treatment and disposal technology to the two disposal technologies that were already described in the exception, raising the total number of disposal technologies in the exception from two to three. In response to the Technical Committee’s valid concern regarding providing no direction to the end user, the phrase “as described in sections H 301.1 (5) and (6)” is proposed as an addition to the original item #282. This addition will refer the end user back to Sections H 301.1(5) and H 301.1 (6), where these effluent disposal technologies are described for sizing and construction information. This is a warranted clarification that should have been made long ago.

**Derek DeLand:**
Item #282 is a necessary addition to the UPC if proposed Item #278 is accepted.

Item #282 simply seeks to add combined treatment and dispersal (CTD) systems to the two existing exceptions listed under H 601.2. As stated in comments for Item #278, this proposal provides another option for design engineers and regulators to utilize when confronted with needs for enhanced/secondary treatment via passive means. The TC’s objections cited to the Item #282 were focused on the proposed language “treat and dispose of sewage within a single footprint.” The TC’s rationale that it “gives no direction to the end user” and is “vague and unenforceable” were discussed at the IAPMO Assembly Considerations Session meeting on 9/28/21. To address this concern, an amendment to the proposed language was provided by the submitter. This additional/amended language was satisfactory to the Assembly in addressing the TC’s issues and resulted in their decision to recommend to the TC to accept Item #282 as amended. This comment is in support of the Assembly’s decision and, once proposed, the TC is encouraged to accept Item #282 as amended.

**Abraham I. Murra:**
At the meeting on September 28, 2021, the Assembly heard technical arguments from engineers, regulators, designers, users, testing engineers, and manufacturers —with significant experience in the wastewater treatment industry— comprehensively addressing the concerns expressed by the UPC TC for rejecting Item # 282 and supporting the approval of the proposal. In addition, during the discussion, the proponent offered an amendment to address the UPC TC’s concerns. The Assembly determined that the supporting arguments satisfactorily addressed the UPC TC concerns and recommended changing the action on the proposal to “accept as amended.” This comment is in support of the Assembly’s decision and a request for the UPC TC to formally “accept as amended” Item # 278.

**Lance Bates:**
I see increased usage of CTD technology in the field by septic system installers, so adding it to the Code is appropriate so industry has a common point of reference for the design and construction of the technology.

Demand is increasing for CTD systems each year.

I have personally witnessed the success these systems have delivered for homeowners.

CTD technology is passive, requiring no electricity and resilient to weather and other conditions that can upset other types of wastewater systems.

My experience is that CTD technology provides excellent hydraulic function while providing secondary treatment of wastewater.
Adding CTD technology to the Code helps solve a problem of providing a uniform set of regulatory requires for California counties to use in administering this technology.

This proposal solves multiple problems: 1) it provides a framework for health departments to regulate a sixth wastewater system technology; 2) it expands the tools septic system designers have available for designing the disposal area; and 3) this proposal represents a design option, not a requirement.

The proposal should move forward as proposed because it describes a system capable of providing secondary treatment of domestic wastewater, thereby promoting environmental stewardship and recharging aquifers at a time when water suppliers are under tremendous pressure to serve the needs of the public. As a Californian, I support the increased usage of such systems for drought-stricken areas across the Western United States.
Proposals

Item #: 288
UPC 2024 Section: L 201.0, L 402.3.2 - L 503.3.6, Table 1701.2

SUBMITTER: Jim Kendzel
American Supply Association
Rep. Chairman of the Alternate Water Sources Task Group

RECOMMENDATION:
Revise text

L 201.0 Definitions

Dedicated Meter. A water measuring device used at a subsection or end use of a water supply system for any of the following purposes: billing, water management, collecting and analyzing water usage data, detection of leaks, equipment failure, water waste, and irregular or abnormal use for a specific application. Also called a submeter.

Dry Weather Runoff. Water that flows along a surface, in a channel or sub-surface including groundwater seepage, and is not associated with a rain event.

ET<sub>c</sub>. Evapotranspiration rate of the plants derived by multiplying ET<sub>o</sub> by the appropriate plant factor or coefficient.

ET<sub>o</sub>. Reference evapotranspiration for a cool-season grass as calculated by the standardized Penman-Monteith equation based on weather-station data.

Flow-Through Design. A fitting or a fitting configuration with two primary inlet connections and one, or more outlet connections with the purpose to supply water to a fixture fitting.

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) per hour per emitter; microspray, micro-jet, and misters shall discharge water at a maximum of 30 gallons (114 L) per hour per nozzle.

L 402.3.2 Nonwater Urinals with Drain Cleansing Action. Nonwater urinals with drain cleansing action shall comply with ASME A112.19.19 and shall be cleaned, maintained, and installed in accordance with the manufacturer’s installation instructions.

L 402.6.2 Bath and Shower Diversers. The rate of leakage out of the Tub spout of bath and shower diversers, while operating in the shower mode, shall not exceed 0.1 gpm (0.4 L/m) in accordance with ASME A112.18.1/CSA B125.1 perform with zero leakage.

L 402.6.3 Shower Valves. Shower valves shall comply with the temperature control performance requirements of ASSE 1016 or ASME A112.18.1/CSA B125.1 where ASSE 1016/ASME A112.1016/CSA B125.16 when tested at 2.0 gpm (7.6 L/m) for the rated flow rate of the installed showerhead.

L 402.6.3.1 Marking. Control valves for showers and tub/shower combinations shall be tagged, labeled, or marked with the manufacturer’s minimum rated flow and such marking shall be visible after installation.

L 402.8 Commercial Pre-Rinse Spray Valves. The flow rate for a pre-rinse spray valve installed in a commercial kitchen to remove food waste from cookware and dishes before cleaning shall not be more than 1.28 gpm (4.8 L/m) at 60 psi (414 kPa). Where pre-rinse spray valves with maximum flow rates of 1.0 gpm (3.8 L/m) or less are installed, the static pressure shall be not less than 30 psi (207 kPa). Commercial kitchen pre-rinse spray valves shall be equipped with an integral automatic shutoff. Pre-rinse spray valves shall be listed to the EPA WaterSense Commercial Pre-rinse Spray Valve Specification.
L 402.10 Drinking Fountains and Bottle Filling Stations. Bottle filling stations shall be included on or used as a substitute to meet the requirements of drinking fountains in at least 50 percent of the requirements for drinking fountains. Bottle filling stations and drinking fountains shall be self-closing.

L 404.2 Ice Makers. Ice makers shall be air cooled and shall be in accordance with Energy Star for energy use for commercial ice machines. Ice makers producing cubed-type ice shall not exceed 20 gallons (75.7 L) of water per 100 pounds (45.4 kg) of ice produced. Ice makers producing nugget and flake ice shall not exceed 14 gallons of water per 100 pounds (45.4 kg) of ice produced.

L 404.5 Grease Interceptors. Grease interceptor maintenance procedures shall not include post-pumping/cleaning refill using potable water. Refill shall be by connected appliance accumulated discharge only.

L 404.5.1 Temperature. Grease Interceptors shall be designed and installed to maintain a mean temperature not exceeding 95°F (35°C). FOG (fats, oils, and greases) disposal systems in compliance with ASME A112.14.6 using biological cultures shall not exceed 104°F (40°C). Passive or active cooling and heat recovery to be employed where applicable.

L 404.6 Dipper Well Faucets. Where dipper wells have a permanent water supply, the faucet shall have metered or sensor activated flow. The volume of water dispensed into a dipper well in each activation cycle of a self-closing fixture fitting shall not exceed the water capacity of the dipper well, and the maximum flow shall not exceed 0.2 gpm (0.8 L/m) at a supply pressure of 60 psi (414 kPa). Where dipper wells are installed, the water supply to a dipper well shall have a shut-off valve and flow control. The flow of water into a dipper well shall be limited by not less than one of the following methods:

1. Water flow shall not exceed the water capacity of the dipper well in one minute at a supply pressure of 60 psi (414 kPa), and the maximum flow shall not exceed 2.2 gpm (8.3 L/m) at a supply pressure of 60 psi (414 kPa). The water capacity of a dipper well shall be the maximum amount of water that the fixture can hold before water flows into the drain.

2. The volume of water dispensed into a dipper well in each activation cycle of a self-closing fixture fitting shall not exceed the water capacity of the dipper well, and the maximum flow shall not exceed 2.2 gpm (8.3 L/m) at a supply pressure of 60 psi (414 kPa).

L 404.7 Pulpers and Mechanical Strainers. The water use for pulpers or mechanical strainers shall not exceed 3 2 gpm (44.4 7.6 L/m). A flow restrictor shall be installed on the water supply to limit the water flow.

L 404.8 Tempering Water. The discharge waste from commercial dishwashers, ware washers, combination ovens, and food steamers that exceeds 140°F (60°C) shall not be tempered with potable water.

(renumber remaining sections)

L 405.1 General. Where installed, leak detection and control devices shall comply with IAPMO IGC 115 or IAPMO IGC 349. Leak detection and control devices help protect property from water damage and also conserve water by shutting off the flow when leaks are detected shall not be installed where they isolate fire sprinkler systems.

L 407.1 Required. A water meter shall be required for each building site connected to a public water system, including municipally supplied reclaimed (recycled) water. In other than single-family houses, a dedicated meter multifamily structures of three stories or fewer above grade, and modular houses, a separate meter or submeter shall be installed in accordance with Table L 407.1 the following locations:

1. The water supply for irrigated landscape with an accumulative area exceeding 2500 square feet (232.3 m²).
2. The water supply to a water using process where the consumption exceeds 1000 gallons per day (gal/d) (0.0438 L/s), except for manufacturing processes.
3. The water supply to each building on a property with multiple buildings where the water consumption exceeds 500 gals/d (0.021 L/s).
4. The water supply to an individual tenant space on a property where one or more of the following applies:
   a. Water consumption exceeds 500 gals/d (0.021 L/s) for that tenant.
   b. Tenant space is occupied by a commercial laundry, cleaning operation, restaurant, food service, medical office, dental office, laboratory, beauty salon, or barbershop.
   c. Total building area exceeds 50 000 square feet (4645 m²).
5. The makeup water supplies to a swimming pool.

L 407.3 Remote Data Transfer Requirements. Consumption Data. A means of communicating water consumption data from submeters to the water consumer shall be provided. Where more than 10 non-utility-owned water meters are located at a building site, the meters shall include remote data transfer capability to collect and analyze the data at a single location.
<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>REQUIREMENTS</th>
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</thead>
<tbody>
<tr>
<td>Cooling Towers</td>
<td>The makeup water supply to cooling towers, evaporative condensers, and fluid coolers. Cooling towers sharing a common basin can be grouped together using one meter.</td>
</tr>
<tr>
<td>Evaporative Coolers</td>
<td>The makeup water supply to an evaporative cooler having an air flow exceeding 30,000 cubic feet per minute ($\text{ft}^3/\text{min})$ ($50,970.3 \text{ m}^3/\text{hr}$).</td>
</tr>
<tr>
<td>Fluid Coolers and Chillers – Open Systems</td>
<td>The makeup water supply on water-cooled fluid coolers and chillers not utilizing closed-loop recirculation.</td>
</tr>
<tr>
<td>Hydronic Cooling Systems – Closed Loop</td>
<td>Systems with 50 ton (175,843 W) or greater of cooling capacity and where a make-up water supply is connected.</td>
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<tr>
<td>Hydronic Heating Systems</td>
<td>The makeup water supply to one or more boilers collectively exceeding 1,000,000 British thermal units per hour (Btu/h) (293,071 W).</td>
</tr>
<tr>
<td>Industrial Processes</td>
<td>The water supply to an industrial water-using process where the average consumption exceeds 1000 gallons per day (gal/d) (3,785 L/d). Like equipment sharing one common water supply can be grouped together using one meter.</td>
</tr>
<tr>
<td>Landscape Irrigation</td>
<td>Landscape irrigation water where either of the following conditions exist: (1) Total accumulated landscape area with in-ground irrigation system exceeds 2500 square feet ($232 \text{ m}^2$), or (2) Total accumulated landscape area using an automatic irrigation controller exceeds 1500 square feet ($139 \text{ m}^2$)</td>
</tr>
<tr>
<td>Onsite Water Collection Systems</td>
<td>Potable or reclaimed water supplies for supplementing onsite alternative water collection systems.</td>
</tr>
<tr>
<td>Ornamental Water Features</td>
<td>Potable or reclaimed water supplies for ornamental water features where the water feature uses an automatic refill valve.</td>
</tr>
<tr>
<td>Pools and Spas</td>
<td>A makeup water supply to a swimming pool or spa.</td>
</tr>
<tr>
<td>Roof Spray Systems</td>
<td>Roof spray systems for irrigating vegetated roofs or thermal conditioning covering an area greater than 300 square feet ($28 \text{ m}^2$).</td>
</tr>
<tr>
<td>Tenant Buildings - Common Areas</td>
<td>Water supplies used in common areas of a site. The dedicated meter for common area water use shall not include water supplied inside tenant space. Water supplies for sanitary fixtures and other water use in common areas can be grouped together for metering requirements, except where dedicated water meter installations are otherwise required.</td>
</tr>
<tr>
<td>Tenant Spaces - Residential</td>
<td>All water supplies to each residential tenant space for indoor water use.</td>
</tr>
<tr>
<td>Tenant Spaces - Non-residential, car washes</td>
<td>All water supplies to individual non-residential tenant spaces for indoor water use where any of the following conditions exist: (1) The nominal size of a water supply pipe(s) to the individual tenant space is greater than ½ inch, or (2) Water consumption within the tenant space is estimated or expected to average greater than 1000 gallons/day (3,785 L/d). Where water is supplied to tenant space that is not required to have dedicated meter, the water supply pipe(s) shall be accessible to install a meter.</td>
</tr>
</tbody>
</table>
L 410.3 Point-of-Use Reverse Osmosis Water Treatment Systems. Reverse osmosis water treatment systems installed in residential occupancies shall be equipped with automatic shutoff valves to prevent discharge when there is no call for producing treated water. Reverse osmosis water treatment systems shall be listed in accordance with NSF 58.

L 410.4 Drinking Water Treatment Systems. Drinking water treatment systems shall be listed to WQA/ASPE S-803.

L 411.1 General. Where landscape irrigation systems are installed, they shall be in accordance with Section L 411.2 through Section L 411.14. 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.

L 411.1.1 Irrigation Design and Installation. The Authority Having Jurisdiction shall have the authority to require landscape irrigation contractors, installers, or designers to demonstrate competency. The system shall be designed and record drawings showing changes during installation shall be made available for the owner and for any required inspections. Where required by the Authority Having Jurisdiction, the contractor, installer, or designer shall be licensed, certified, or both to perform such work.

L 411.2 Plant and Irrigation System Limitations. Nuisance, invasive and noxious plants as defined by the Authority Having Jurisdiction shall not be used in the landscape. Plants not requiring supplemental irrigation and not principally used as an athletic field or public recreation shall be used in no less than 60 percent of the landscape that is not principally used as an athletic field or public recreation. Inground irrigation system shall not be installed in more than 40 percent of the landscaped area.

Exceptions:
(1) Where average annual rainfall is less than 12 inches (305 mm) and in landscape areas where the plant materials have an annual ETc of not exceeding 15 inches (381 mm), an in-ground irrigation system shall be allowed.
(2) Where neither potable or reclaimed (recycled) water is used in the irrigation system, an in-ground irrigation system shall be allowed in 100 percent of the landscaped area and vegetative roofs.

L 411.3 Vegetative Roofs and Walls. Irrigation systems using potable water for vegetative roofs and walls are prohibited.

L 411.4 Maximum Velocity. Velocity of water flow shall not exceed 5 feet per second (1.5 m/s) for thermoplastic irrigation pipes. Velocity of water flow shall not exceed 7.5 feet per second (2.3 m/s) for metal irrigation pipes.

L 411.2 Backflow Protection. Potable water and reclaimed water supplies to landscape irrigation systems shall be protected from backflow in accordance with this code and the Authority Having Jurisdiction.

L 411.3 Use of Alternate Water Sources for Landscape Irrigation. Where available by pre-existing treatment, storage, or distribution network, and where approved by the Authority Having Jurisdiction, alternative water source(s) shall be utilized for landscape irrigation. Where adequate capacity and volumes of pre-existing alternative water sources are available, the irrigation system shall be designed to use a minimum of 75 percent of alternative water for the annual irrigation demand before supplemental potable water is used.

Exception: Plants grown for food production.

L 411.3.1 Master Valve. Where continuously pressurized alternate water sources supply an existing irrigation system, a master valve shall be installed at the point where the alternate water sources supply piping connects to the existing irrigation system downstream of the backflow preventer where required.

L 411.3.2 Identification. Where alternate water sources supply an existing irrigation system, the existing sprinkler heads, valve boxes, the continuously pressurized line supplying the irrigation master valve, or any other components required by the Authority Having Jurisdiction shall be colored purple. The piping supplying the irrigation master valve shall be identified in accordance with Chapter 15 of this code.

L 411.3.2.1 Additional Zones. Newly installed zones shall have purple pipe.

L 411.4 Irrigation Control Systems. Where installed as part of a landscape irrigation system, irrigation control systems shall:
(1) Automatically adjust the irrigation schedule to respond to plant water needs determined by weather or soil moisture conditions.
(2) Utilize onsite sensors or remote weather data to inhibit or to suspend irrigation when adequate soil moisture is present or during a rainfall or freezing conditions.
(3) Utilize either one or more on-site sensors or a weather-based irrigation controller listed to the US EPA WaterSense Weather Based Irrigation Controllers Specification to suspend irrigation where adequate soil moisture is present for plant growth.
(4) Have the capability to program multiple and different run times for each irrigation zone to enable cycling of water applications and durations to mitigate water flowing off of the intended irrigation zone.
(5) Be capable of indicating to the user when it is not receiving a signal or local sensor input.
(6) Be capable of allowing for a manual operation troubleshooting test cycle and shall automatically return to sensor input mode within some period of time as designated by the manufacturer, even when the switch is still positioned for manual operation.
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:

(a) Precipitation rate for each zone.
(b) Plant evapotranspiration coefficients for each zone.
(c) Soil absorption rate for each zone.
(d) Rain sensor settings.
(e) Soil moisture setting.
(f) Peak demand schedule including run times for each zone and the number of cycles to mitigate runoff and monthly adjustments or percentage change from peak demand schedule.

L 411.5 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.

L 411.5 Low Flow Irrigation. Irrigation zones using low flow irrigation emitters with emitter flow rates not to exceed 6.3 gallons (24 L) per hour shall comply with ASABE/ICC 802 Landscape Irrigation Sprinkler and Emitter Standard and shall be equipped with filters sized according to the manufacturer’s recommendation for the specific low flow emitter, and with a pressure regulator installed upstream of the irrigation emission devices as necessary to reduce the operating water pressure in accordance with the manufacturers’ equipment requirements.

L 411.6 Mulched Planting Areas. Only low flow emitters with flow rates not to exceed 6.3 gallons (24 L) per hour are allowed to be installed in mulched planting areas with vegetation taller than 12 inches (305 mm).

L 411.7 System Performance Requirements. The landscape irrigation system shall be designed and installed to:

1. Prevent irrigation water from runoff out of the irrigation zone.
2. Prevent water in the supply line drainage from draining out between irrigation events.
3. Not allow irrigation water to be applied onto or enter non-targeted areas including adjacent property and vegetation areas, adjacent hydrozones not requiring the irrigation water to meet its irrigation demand, non-vegetative areas, impermeable surfaces, roadways, and structures.

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

L 411.8 Narrow or Irregularly Shaped Landscape Areas. Narrow or irregularly shaped landscape areas, less than 4 feet (1219 mm) in any direction across opposing boundaries, shall not be irrigated by an irrigation emission device except low flow emitters with flow rates not to exceed 6.3 gallons (24 L) per hour.

L 411.9 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 (19.1 mm) per hour as verified through either of the following methods:

1. Manufacturer documentation that the precipitation rate for the installed sprinkler head does not exceed 0.75 inches (19.1 mm) per hour where the sprinkler heads are installed not closer than the specified radius and where the water pressure of the irrigation system is not more than the manufacturer’s recommendations.
2. Catch can test in accordance with the requirements of the Authority Having Jurisdiction and where emitted water volume is measured with a minimum of six 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 (mm/h).

L 411.9 Irrigation System Inspection and Performance Check. The irrigation system shall be inspected to verify compliance with the irrigation design in accordance with the following:

1. 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.
2. Sprinklers shall be installed as specified with proper spacing and required nozzle.
3. Sprinklers shall be activated and visually inspected for covering areas without causing overspray or runoff.
4. Valves shall be installed as specified.
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.
6. Control system shall be installed as specified and listed as a US EPA WaterSense labeled controller, and all sensors shall be installed and verified for proper installation and operation.
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.
8. Record drawings of the irrigation system shall be completed and provided for the irrigation inspection.
9. An inspection report shall be provided to the property owner or management company identifying problems and what corrective actions are required.
L 411.10.1 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 6% percent as labeled or declared in manufacturer's published performance data).

L 411.10.4 Sprinkler Head Maximum Precipitation Rate. Where the slope of the landscape exceeds 25 percent, the precipitation rate of sprinkler heads shall not exceed 1.75 inches per hour when tested to ASABE/ICC 802.

L 411.11 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 inch per hour (25.4 mm/h) as verified through either of the following methods:

1. Manufacturer's documentation that the precipitation rate for the installed sprinkler head does not exceed 1 inch per hour (25.4 mm/h) where the sprinkler heads are installed not closer that the specified radius and where the water pressure of the irrigation system is not more than the manufacturer's recommendations.
2. Catch cans test in accordance with the requirements of the Authority Having Jurisdiction and where emitted water volume is measured with a minimum of six 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 (mm/h).

L 411.11 Outside Hose Bibbs. Outside hose bibbs shall be allowed on irrigation pipe downstream of the backflow preventer. Hose bibbs supplying water from the irrigation system shall be indicated by posted signs marked with the words: “CAUTION: NONPOTABLE WATER. DO NOT DRINK” and the symbol in Figure 1505.9 of this code.

L 411.14 Qualifications. The Authority Having Jurisdiction shall have the authority to require landscape irrigation contractors, installers, or designers to demonstrate competency. Where required by the Authority Having Jurisdiction, the contractor, installer, or designer shall be certified to perform such work.

L 501.2.2 Building Cavities. Building cavities used for hot water supply and return piping shall be large enough to accommodate the combined diameter of the pipe plus the insulation, plus any other objects in the cavity that the piping must cross.

L 502.7 Maximum Volume and Length of Hot Water. The maximum volume of water contained in a hot water branch distribution pipe shall be in accordance with Section L 502.7.1 or Section L 502.7.2. The water volume shall be calculated using Table L 502.7. The maximum length per volume of piping shall comply with Section L 502.7.2.

L 502.7.1 Maximum Volume of Hot Water in a Branch Without Recirculation or Heat Trace. The maximum volume of water contained in hot water distribution pipe between the water heater and any fixture fitting shall not exceed 32 ounces (oz) (946 mL). Where a fixture fitting shutoff valve (supply stop) is installed ahead of the fixture fitting, the maximum volume of water is permitted to be calculated between the water heater and the fitting shutoff valve (supply stop).

The water volume per foot of piping shall be calculated using Table L 502.7.1. The maximum volume of water in a fixture branch between 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:

1. 24 oz, where a single branch serves a single fixture.
2. 40 oz, where a series branch incorporating one or more flow-through design configurations that serves two or more fixtures.
3. 60 oz, where a ring branch incorporating two or more flow-through design configurations that serves two or more fixtures.

Exceptions:

1. The maximum volume of 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 contain more than 40 oz.
2. The maximum volume of a single branch to a standalone tub shall not contain more than 80 oz.

L 502.7.2 Maximum Length Per Volume of Water in a Branch Volume of Hot Water with Recirculation or Heat Trace. The maximum volume of water contained in the branches between the recirculation loop or electrically heat traced pipe, and the fixture fitting shall not exceed 16 oz (473 mL). Where a fixture fitting shutoff valve (supply stop) is installed ahead of the fixture fitting, the maximum volume of water is permitted to be calculated between the recirculation loop or electrically, heat traced pipe and the fixture fitting shutoff valve (supply stop).

Exception: Whirlpool bathtubs or bathtubs that are not equipped with a shower are exempted from the requirements of Section L 502.7. For fixture branches in accordance with Section 1003.7.1, the maximum length of piping shall be calculated using Table L 502.7.2(1) through Table L 502.7.2(4). Where a fixture fitting shutoff 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 shutoff valve (supply stop).
### TABLE L 502.7.1
WATER VOLUME FOR DISTRIBUTION PIPING MATERIALS

<table>
<thead>
<tr>
<th>NOMINAL SIZE (inch)</th>
<th>COPPER TYPE M</th>
<th>COPPER TYPE L</th>
<th>COPPER TYPE K</th>
<th>CPVC SDR 11</th>
<th>CPVC SCH 40</th>
<th>PE-AL-PEX</th>
<th>CPVC SDR 80</th>
<th>PE-CTS SDR 9</th>
<th>PE-RT SDR 9</th>
<th>PP SDR 6</th>
<th>PP SDR 7.3</th>
<th>PP SDR 11</th>
<th>CPVC PIPE SDR 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>1.06</td>
<td>0.97</td>
<td>0.84</td>
<td>0.85</td>
<td>0.5943</td>
<td>0.5943</td>
<td>0.85</td>
<td>0.5943</td>
<td>0.64</td>
<td>0.64</td>
<td>0.8539</td>
<td>0.1028</td>
<td>1.24 NA</td>
</tr>
<tr>
<td>1/2</td>
<td>1.69</td>
<td>1.55</td>
<td>1.45</td>
<td>1.2341</td>
<td>1.2341</td>
<td>1.2341</td>
<td>1.18</td>
<td>1.18</td>
<td>1.18</td>
<td>1.18</td>
<td>1.3544</td>
<td>1.648</td>
<td>2.12 NA</td>
</tr>
<tr>
<td>3/4</td>
<td>3.43</td>
<td>3.22</td>
<td>2.90</td>
<td>2.5267</td>
<td>3.2839</td>
<td>3.2839</td>
<td>2.74</td>
<td>2.35</td>
<td>2.35</td>
<td>2.35</td>
<td>2.4529</td>
<td>2.5462</td>
<td>3.37 NA</td>
</tr>
<tr>
<td>1</td>
<td>5.81</td>
<td>5.49</td>
<td>5.17</td>
<td>4.2434</td>
<td>5.3766</td>
<td>5.3766</td>
<td>4.58</td>
<td>3.8844</td>
<td>3.8844</td>
<td>3.8844</td>
<td>4.2236</td>
<td>4.5646</td>
<td>5.56 NA</td>
</tr>
</tbody>
</table>

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

### TABLE L 502.7.2(1)
LENGTH (FT) PER VOLUME OF PIPING

<table>
<thead>
<tr>
<th>NOMINAL SIZE (inch)</th>
<th>COPPER TYPE M</th>
<th>COPPER TYPE L</th>
<th>COPPER TYPE K</th>
<th>CPVC CTS SDR 11</th>
<th>CPVC SCH 40</th>
<th>PE-AL-PEX</th>
<th>CPVC SDR 80</th>
<th>PE-CTS SDR 9</th>
<th>PE-RT SDR 9</th>
<th>PP SDR 6</th>
<th>PP SDR 7.3</th>
<th>PP SDR 11</th>
<th>CPVC PIPE SDR 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>22.7</td>
<td>37.8</td>
<td>56.7</td>
<td>24.9</td>
<td>41.4</td>
<td>62.1</td>
<td>28.4</td>
<td>47.4</td>
<td>71.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2</td>
<td>14.2</td>
<td>23.7</td>
<td>35.5</td>
<td>15.5</td>
<td>25.8</td>
<td>38.7</td>
<td>16.5</td>
<td>27.6</td>
<td>41.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3/4</td>
<td>7.0</td>
<td>11.6</td>
<td>17.5</td>
<td>7.5</td>
<td>12.4</td>
<td>18.6</td>
<td>8.3</td>
<td>13.8</td>
<td>20.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>4.1</td>
<td>6.9</td>
<td>10.3</td>
<td>4.4</td>
<td>7.3</td>
<td>10.9</td>
<td>4.6</td>
<td>7.7</td>
<td>11.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/4</td>
<td>2.8</td>
<td>4.6</td>
<td>6.9</td>
<td>2.9</td>
<td>4.8</td>
<td>7.2</td>
<td>3.0</td>
<td>4.9</td>
<td>7.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/2</td>
<td>2.0</td>
<td>3.3</td>
<td>4.9</td>
<td>2.0</td>
<td>3.4</td>
<td>5.1</td>
<td>2.1</td>
<td>3.5</td>
<td>5.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1.1</td>
<td>1.9</td>
<td>2.8</td>
<td>1.2</td>
<td>1.9</td>
<td>2.9</td>
<td>1.2</td>
<td>2.0</td>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

### TABLE L 502.7.2(2)
LENGTH (FT) PER VOLUME OF PIPING

<table>
<thead>
<tr>
<th>NOMINAL SIZE (inch)</th>
<th>CPVC CTS SDR 11</th>
<th>CPVC SCH 40 PIPE</th>
<th>CPVC SCH 80 PIPE</th>
<th>CPVC SDR 11 PIPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>35.5</td>
<td>59.1</td>
<td>88.6</td>
<td>20.5</td>
</tr>
<tr>
<td>1/2</td>
<td>19.5</td>
<td>32.6</td>
<td>48.8</td>
<td>12.7</td>
</tr>
<tr>
<td>3/4</td>
<td>9.5</td>
<td>15.9</td>
<td>23.8</td>
<td>7.1</td>
</tr>
<tr>
<td>1</td>
<td>5.7</td>
<td>9.4</td>
<td>14.2</td>
<td>4.3</td>
</tr>
<tr>
<td>11/4</td>
<td>3.8</td>
<td>6.3</td>
<td>9.4</td>
<td>2.5</td>
</tr>
<tr>
<td>11/2</td>
<td>2.7</td>
<td>4.5</td>
<td>6.7</td>
<td>1.8</td>
</tr>
<tr>
<td>2</td>
<td>1.6</td>
<td>2.6</td>
<td>3.9</td>
<td>1.1</td>
</tr>
</tbody>
</table>

For SI units: 1 foot = 304.8 mm, 1 ounce = 29.573 mL
### TABLE L 502.7.2 (3)
LENGTH (FT) PER VOLUME OF PIPING

<table>
<thead>
<tr>
<th>NOMINAL SIZE, inches (DN)*</th>
<th>PEX &amp; PE-RT CTS SDR 9</th>
<th>PEX-AL-PEX (DN)</th>
<th>PE-AL-PE (DN)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 OZ</td>
<td>40 OZ</td>
<td>60 OZ</td>
</tr>
<tr>
<td>3/8(12)</td>
<td>37.5</td>
<td>62.5</td>
<td>93.8</td>
</tr>
<tr>
<td>1/2(16)</td>
<td>20.4</td>
<td>33.9</td>
<td>50.9</td>
</tr>
<tr>
<td>3/4(25)</td>
<td>10.2</td>
<td>17.0</td>
<td>25.5</td>
</tr>
<tr>
<td>1(32)</td>
<td>6.2</td>
<td>10.3</td>
<td>15.5</td>
</tr>
<tr>
<td>1 1/4(40)</td>
<td>4.1</td>
<td>6.9</td>
<td>10.3</td>
</tr>
<tr>
<td>1 1/2(50)</td>
<td>3.0</td>
<td>4.9</td>
<td>7.4</td>
</tr>
<tr>
<td>2(63)</td>
<td>1.7</td>
<td>2.9</td>
<td>4.3</td>
</tr>
</tbody>
</table>

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

* DN is outside diameter

### TABLE L 502.7.2 (4)
LENGTH (FT) PER VOLUME OF PIPING

<table>
<thead>
<tr>
<th>NOMINAL SIZE, inches (DN)2</th>
<th>PP SDR 6 (DN)</th>
<th>PP SDR 7.3 (DN)</th>
<th>PP SDR 11 (DN)1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 OZ</td>
<td>40 OZ</td>
<td>60 OZ</td>
</tr>
<tr>
<td>3/8(16)</td>
<td>28.2</td>
<td>46.9</td>
<td>70.4</td>
</tr>
<tr>
<td>1/2(20)</td>
<td>17.7</td>
<td>29.6</td>
<td>44.3</td>
</tr>
<tr>
<td>3/4(25)</td>
<td>11.2</td>
<td>18.7</td>
<td>28.0</td>
</tr>
<tr>
<td>1 (32)</td>
<td>6.9</td>
<td>11.6</td>
<td>17.3</td>
</tr>
<tr>
<td>1 1/4(40)</td>
<td>4.4</td>
<td>7.3</td>
<td>11.0</td>
</tr>
<tr>
<td>1 1/2(50)</td>
<td>2.8</td>
<td>4.6</td>
<td>6.9</td>
</tr>
<tr>
<td>2(63)</td>
<td>1.8</td>
<td>2.9</td>
<td>4.4</td>
</tr>
</tbody>
</table>

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

**Notes:**
1. PP SDR 11 products are not typically used or rated at 180°F
2. DN is outside diameter

### L 503.3.3 Insulation
Insulation of hot water and return piping shall meet the provisions in Section L 501.2. The following piping shall be insulated in accordance with Table L 503.3.3:

1. Recirculating system piping, including the supply and return piping of a circulating tank type water heater.
2. The first 8 feet (2438 mm) of outlet piping for a constant temperature nonrecirculating storage system.
3. The first 8 feet (2438 mm) of branch piping connecting to recirculated, heat-traced, or impedance heated piping.
4. The inlet piping between the storage tank and a heat trap in a nonrecirculating storage system.
5. Piping that is externally heated (such as heat trace or impedance heating). [ASHRAE 90.1:7.4.3]

### TABLE L 503.3.3
MINIMUM PIPING INSULATION THICKNESS FOR HEATING AND HOT-WATER SYSTEMS (STEAM, STEAM CONDENSATE, HOT-WATER HEATING, AND DOMESTIC WATER SYSTEMS) [ASHRAE 90.1: TABLE 6.8.3-1]

<table>
<thead>
<tr>
<th>FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)</th>
<th>INSULATION CONDUCTIVITY = NOMINAL PIPE SIZE OR TUBE SIZE (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONDUCTIVITY = Btu•inches/(h•ft²•°F)</td>
<td>MEAN-RATING TEMPERATURE (°F)</td>
</tr>
<tr>
<td>&gt;350</td>
<td>0.32 to 0.34</td>
</tr>
<tr>
<td>251-to-350</td>
<td>0.29 to 0.32</td>
</tr>
<tr>
<td>201-to-250</td>
<td>0.27 to 0.30</td>
</tr>
<tr>
<td>141-to-200</td>
<td>0.25 to 0.29</td>
</tr>
<tr>
<td>105-to-140</td>
<td>0.22 to 0.28</td>
</tr>
</tbody>
</table>
For SI units: °C=(°F-32)/1.8, 1 British thermal unit inch per hour square foot degree Fahrenheit = [0.1 W/(m•K)], 1 inch = 25 mm

Notes:
1 For insulation outside the stated conductivity range, the minimum thickness ($T$) shall be determined as follows:

\[ T = \frac{r}{(1 + t/r)K/k - 1} \]

Where:
- $T$ = minimum insulation thickness (inches) (mm).
- $r$ = actual outside radius of pipe (inches) (mm).
- $t = $ insulation thickness listed in this table for applicable fluid temperature and pipe size.
- $K$ = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature [Btu/(h•in²•°F)] [W/(m•K)].
- $k = $ the upper value of the conductivity range listed in this table for the applicable fluid temperature.

2 These thicknesses are based on energy efficiency considerations only. Additional insulation is sometimes required relative to safety issues or surface temperature.

3 For piping 11/2 inches (40 mm) or less, and located in partitions within conditioned spaces, reduction of insulation thickness by 1 inch (25.4 mm) shall be permitted before thickness adjustment required in Footnote 1, but not a thickness less than 1 inch (25.4 mm).

4 For direct-buried heating and hot water system piping, reduction of insulation thickness by 11/2 inch (38 mm) shall be permitted before thickness adjustment required in Footnote 1, but not a thickness less than 1 inch (25.4 mm).

5 Table L 503.3.3 is based on steel pipe. Non-metallic pipes, Schedule 80 thickness or less shall use the table values. For other non-metallic pipes having a thermal resistance more than that of steel pipe, reduced insulation thicknesses shall be permitted where documentation is provided showing that the pipe with the proposed insulation has no more heat transfer per foot (mm) than a steel pipe of the same size with the insulation thickness shown in Table L 503.3.3.

L 503.3.6 Swimming Pools, Spas, and Hot Tubs. Pool, spa, and hot tub heating systems shall comply with Section L 503.3.6(1) through Section L 503.3.6(3) L 503.3.6(5).

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

2 Heated pools and inground permanently installed spas, and portable spas, shall be equipped provided with a non-liquid vapor retardant pool cover on or at the water surface. Pools heated to more than 90°F (32°C) shall have a pool cover with a minimum insulation value of R-12.

Exception: Pools that are deriving over Where more than 69 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy. [ASHRAE 90.1:7.4.5.2]

3 Portable spa covers shall meet the requirements of APSP-14.

4 Pool pumps and replacement pool pump motors shall meet requirements of APSP-15.

<table>
<thead>
<tr>
<th>TABLE 1701.2</th>
<th>STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOCUMENT NUMBER</td>
<td>DOCUMENT TITLE</td>
</tr>
<tr>
<td>ASABE/ICC 802-2014</td>
<td>Landscape Irrigation Sprinkler and Emitter Standard</td>
</tr>
<tr>
<td>Energy Star-2007</td>
<td>Program Requirements for Commercial Ice Machines</td>
</tr>
<tr>
<td>EPA WaterSense-2017</td>
<td>Specifications for Weather-Based Irrigation Controllers</td>
</tr>
<tr>
<td>WQA/ASPE/ANSI S-803-2017</td>
<td>Sustainable Drinking Water Treatment Systems</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
The proposed changes to Appendix L are updates correlate with the latest edition of the WeStand.

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
There was insufficient technical justification to warrant such change. Section L 402.6.2 is overly stringent by requiring zero leakage. Section L 402.6.3.1 is overly restrictive regarding the marking on the control valves, to be visible after installation. The markings should be left to the applicable standards. In Table L 407.1, the area of 100 square feet for swimming pools is overly restrictive and should be larger.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 22 NEGATIVE: 3 NOT RETURNED: 1 Daniels
EXPLANATION OF NEGATIVE:

BALLANCO: The proposed change would harmonize the code with WE-Stand.

GORSUCH: Agree with Charles White.

WHITE: This is updating Appendix L in alignment with the latest WE-Stand work, as appendices are generally not adopted as mandatory code, jurisdictions could decide to use all or part of the appendix as guidance.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: L 201.0, L 402.3.2 - L 701.2, Table 1701.2  Item #: 288

SUBMITTER: Jim Kendzel  American Supply Association
Rep. Chair, Alternate Water Sources Task Group

RECOMMENDATION: Revise text

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

L 201.0 Definitions.

**Dedicated Meter.** A water measuring device used at a subsection or end use of a water supply system for any of the following purposes: billing, water management, collecting and analyzing water usage data, detection of leaks, equipment failure, water waste, and irregular or abnormal use for a specific application. Also called a submeter.

**Dry Weather Runoff.** Water that flows along a surface, in a channel or sub-surface including groundwater seepage, and is not associated with a rain event.

**ET\(_o\)**. Evapotranspiration rate of the plants derived by multiplying ET\(_o\) by the appropriate plant factor or coefficient.

**ET\(_{c}\)**. Reference evapotranspiration for a cool-season grass as calculated by the standardized Penman-Monteith equation based on weather-station data.

**Flow-Through Design.** A fitting or a fitting configuration with two primary inlet connections and one, or more outlet connections with the purpose to supply water to a fixture fitting.

**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) per hour per emitter; microspray, micro-jet, and misters shall discharge water at a maximum of 30 gallons (114 L) per hour per nozzle.

L 402.3.2 Nonwater Urinals with Drain Cleansing Action. Nonwater urinals with drain cleansing action shall comply with ASME A112.19.19 and shall be cleaned, maintained, and installed in accordance with the manufacturer’s installation instructions.

L 402.6.2 Bath and Shower Diverters. The rate of leakage out of the tub spout of bath and shower diverters, while operating in the shower mode, shall not exceed 0.1 gpm (0.4 L/m) rate of leakage in accordance with ASME A112.18.1/CSA B125.1.

L 402.6.3 Shower Valves. Shower valves shall comply with the temperature control performance requirements of ASSE 1016 or ASME A112.18.1/CSA B125.1 where ASSE 1016/ASME A112.1016/CSA B125.16 when tested at 2.0 gpm (7.6 L/m) for the rated flow rate of the installed showerhead.

L 402.6.3.1 Marking. Control valves for showers and tub/shower combinations shall be tagged, labeled, or marked in accordance with the applicable standards.

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

L 404.2 Ice Makers. Ice makers shall be air cooled and shall be in accordance with Energy Star for energy use for commercial ice machines. Ice makers producing cubed-type ice shall not exceed 20 gallons (75.7 L) of water per 100 pounds (45.4 kg) of ice produced. Ice makers producing nugget and flake ice shall not exceed 14 gallons (63.6 L) of water per 100 pounds (45.4 kg) of ice produced.
L 404.5 Grease Interceptors. Grease interceptor maintenance procedures shall not include post-pumping/cleaning refill using potable water. Refill shall be by connected appliance accumulated discharge only.

L 404.5.1 Temperature. Grease Interceptors shall be designed and installed to maintain a mean temperature not exceeding 95°F (35°C). FOG (fats, oils, and greases) disposal systems in compliance with ASME A112.14.6 using biological cultures shall not exceed 104°F (40°C). Passive or active cooling and heat recovery to be employed where applicable.

L 404.6 Dipper Well Faucets. Where dipper wells have a permanent water supply, the faucet shall have metered or sensor activated flow. The volume of water dispensed into a dipper well in each activation cycle of a self-closing fixture fitting shall not exceed the water capacity of the dipper well, and the maximum flow shall not exceed 0.2 gpm (0.8 L/m) at a supply pressure of 60 psi (414 kPa). Where dipper wells are installed, the water supply to a dipper well shall have a shut-off valve and flow control. The flow of water into a dipper well shall be limited by not less than one of the following methods:

(1) Water flow shall not exceed the water capacity of the dipper well in one minute at a supply pressure of 60 psi (414 kPa), and the maximum flow shall not exceed 2.2 gpm (8.3 L/m) at a supply pressure of 60 psi (414 kPa). The water capacity of a dipper well shall be the maximum amount of water that the fixture can hold before water flows into the drain.

(2) The volume of water dispensed into a dipper well in each activation cycle of a self-closing fixture fitting shall not exceed the water capacity of the dipper well, and the maximum flow shall not exceed 2.2 gpm (8.3 L/m) at a supply pressure of 60 psi (414 kPa).

L 404.7.1 Pulpers and Mechanical Strainers. The water use for pulpers or mechanical strainers shall not exceed 3.2 gpm (11.4 L/m). A flow restrictor shall be installed on the water supply to limit the water flow.

L 404.8 Tempering Water. The discharge waste from commercial dishwashers, ware washers, combination ovens, and food steamers that exceeds 140°F (60°C) shall not be tempered with potable water.

(renumber remaining sections)

L 405.1 General. Where installed, leak detection and control devices shall comply with IAPMO Z1349. Leak detection and control devices protect property from water damage and also conserve water by shutting off the flow when leaks are detected shall not be installed where they isolate fire sprinkler systems.

L 407.1 Required. A water meter shall be required for each building site connected to a public water system, including municipally supplied reclaimed (recycled) water. In other than single-family houses, a dedicated meter shall be installed in accordance with Table L 407.1. Multifamily structures of three stories or fewer above grade, and modular houses, a separate meter or submeter shall be installed in the following locations:

(1) The water supply for irrigated landscape with an accumulative area exceeding 2500 square feet (232.3 m²).
(2) The water supply to a water-using process where the consumption exceeds 1000 gallons per day (gal/d) (0.0438 L/s), except for manufacturing processes.
(3) The water supply to each building on a property with multiple buildings where the water consumption exceeds 500 gals/d (0.021 L/s).
(4) The water supply to an individual tenant space on a property where one or more of the following applies:
   (a) Water consumption exceeds 500 gals/d (0.021 L/s) for that tenant.
   (b) Tenant space is occupied by a commercial laundry, cleaning operation, restaurant, food service, medical office, dental office, laboratory, beauty salon, or barbershop.
   (c) Total building area exceeds 50 000 square feet (4645 m²).
(5) The makeup water supplies to a swimming pool.

L 407.3 Remote Data Transfer Requirements. Consumption Data. A means of communicating water consumption data from submeters to the water consumer shall be provided. Where more than 10 non-utility-owned water meters are located at a building site, the meters shall include remote data transfer capability to collect and analyze the data at a single location.

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling Towers</td>
<td>The makeup water supply to cooling towers, evaporative condensers, and fluid coolers. Cooling towers sharing a common basin can be grouped together using one meter.</td>
</tr>
<tr>
<td>Evaporative Coolers</td>
<td>The makeup water supply to an evaporative cooler having an air flow exceeding 30 000 cubic feet per minute (ft³/min) (50 970.3 m³/hr).</td>
</tr>
<tr>
<td><strong>Fluid Coolers and Chillers – Open Systems</strong></td>
<td>The makeup water supply on water-cooled fluid coolers and chillers not utilizing closed-loop recirculation.</td>
</tr>
<tr>
<td><strong>Hydronic Cooling Systems – Closed Loop</strong></td>
<td>Systems with 50 ton (175,843 W) or greater of cooling capacity and where a make-up water supply is connected.</td>
</tr>
<tr>
<td><strong>Hydronic Heating Systems</strong></td>
<td>The makeup water supply to one or more boilers collectively exceeding 1,000,000 British thermal units per hour (Btu/h) (293,071 W).</td>
</tr>
<tr>
<td><strong>Industrial Processes</strong></td>
<td>The water supply to an industrial water-using process where the average consumption exceeds 1,000 gallons per day (gal/d) (3,785 L/d). Like equipment sharing one common water supply can be grouped together using one meter. <strong>Exception:</strong> Processes using untreated water where the water is directly returned to the original source after use.</td>
</tr>
</tbody>
</table>
| **Landscape Irrigation** | Landscape irrigation water where either of the following conditions exist:  
(1) Total accumulated landscape area with in-ground irrigation system exceeds 2,500 square feet (232 m²), or  
(2) Total accumulated landscape area using an automatic irrigation controller exceeds 1,500 square feet (139 m²). **Exception:** Where the water purveyor provides a separate water supply meter that serves only the irrigation system, an additional dedicated meter is not required. |
| **Onsite Water Collection Systems** | Potable or reclaimed water supplies for supplementing onsite alternative water collection systems. |
| **Ornamental Water Features** | Potable or reclaimed water supplies for ornamental water features where the water feature uses an automatic refill valve. |
| **Roof Spray Systems** | Roof spray systems for irrigating vegetated roofs or thermal conditioning covering an area greater than 300 square feet (28 m²). **Exception:** Temporary above-surface spray systems connected to a hose bibb and without an automatic controller are not required to have a dedicated meter. |
| **Tenant Buildings - Common Areas** | Water supplies used in common areas of a site. The dedicated meter for common area water use shall not include water supplied inside tenant space. Water supplies for sanitary fixtures and other water use in common areas can be grouped together for metering requirements, except where dedicated water meter installations are otherwise required. |
| **Tenant Spaces - Residential** | All water supplies to each residential tenant space for indoor water use. **Exception:** Where a water purveyor has individual meters for each tenant space, and the other meter requirements included in Table 407.1 do not apply, no additional dedicated meter is required. |
| **Tenant Spaces - Non-residential, car washes** | All water supplies to individual non-residential tenant spaces for indoor water use where any of the following conditions exist:  
(1) The nominal size of a water supply pipe(s) to the individual tenant space is greater than ½ inch, or  
(2) Water consumption within in the tenant space is estimated or expected to average greater than 1000
gallons/day (3,785 L/d).
Where water is supplied to tenant space that is not required to have dedicated meter, the water supply pipe(s) shall be accessible to install a meter.
**Exception:** Where a water purveyor has individual meters for each tenant space and the other meter requirements included in Table 407.1 do not apply, no additional dedicated meter is required.

L 410.3 Point-of-Use Reverse Osmosis Water Treatment Systems. Reverse osmosis water treatment systems installed in residential occupancies shall be equipped with automatic shutoff valves to prevent discharge when there is no call for producing treated water. Reverse osmosis water treatment systems shall be listed in accordance with NSF/ANSI 58 and ASSE 1086.

L 410.4 Drinking Water Treatment Systems. Drinking water treatment systems shall be listed to WQA/ASPE S-803.

L 411.1 General. Where landscape irrigation systems are installed, they shall be in accordance with Section L 411.2 through Section L 411.14. 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.

L 411.1.1 Irrigation Design and Installation. The Authority Having Jurisdiction shall have the authority to require landscape irrigation contractors, installers, or designers to demonstrate competency. The system shall be designed and record drawings showing changes during installation shall be made available for the owner and for any required inspections. Where required by the Authority Having Jurisdiction, the contractor, installer, or designer shall be licensed, certified, or both to perform such work.

L 411.2 Plant and Irrigation System Limitations. Nuisance, invasive and noxious plants as defined by the Authority Having Jurisdiction shall not be used in the landscape. Plants not requiring supplement irrigation and not principally used as an athletic field or public recreation shall be used in no less than 60 percent of the landscape that is not principally used as an athletic field or public recreation. Inground irrigation system shall not be installed in more than 40 percent of the landscaped area.

**Exceptions:**
(1) Where average annual rainfall is less than 12 inches (305 mm) and in landscape areas where the plant materials have an annual ETc of not exceeding 15 inches (381 mm), an in-ground irrigation system shall be allowed.
(2) Where neither potable or reclaimed (recycled) water is used in the irrigation system, an in-ground irrigation system shall be allowed in 100 percent of the landscaped area and vegetative roofs.

L 411.3 Vegetative Roofs and Walls. Irrigation systems using potable water for vegetative roofs and walls are prohibited.

L 411.4 Maximum Velocity. Velocity of water flow shall not exceed 5 feet per second (1.5 m/s) for thermoplastic irrigation pipes. Velocity of water flow shall not exceed 7.5 feet per second (2.3 m/s) for metal irrigation pipes.

(renumber remaining sections)

L 411.2 Backflow Protection. Potable water and reclaimed water supplies to landscape irrigation systems shall be protected from backflow in accordance with this code and the Authority Having Jurisdiction.

L 411.3 Use of Alternate Water Sources for Landscape Irrigation. Where available by pre-existing treatment, storage, or distribution network, and where approved by the Authority Having Jurisdiction, alternative water source(s) shall be utilized for landscape irrigation. Where adequate capacity and volumes of pre-existing alternative water sources are available, the irrigation system shall be designed to use a minimum of 75 percent of alternative water for the annual irrigation demand before supplemental potable water is used.

**Exception:** Plants grown for food production for direct human consumption.

L 411.3.1 Master Valve. Where continuously pressurized alternate water sources supply an existing irrigation system, a master valve shall be installed at the point where the alternate water sources supply piping connects to the existing irrigation system downstream of the backflow preventer where required.

L 411.3.2 Identification. Where alternate water sources supply an existing irrigation system, the existing sprinkler heads, valve boxes, the continuously pressurized line supplying the irrigation master valve, or any other components required by the Authority Having Jurisdiction, shall be colored purple. The piping supplying the irrigation master valve shall be identified in accordance with Chapter 15 of this code.

L 411.3.2.1 Additional Zones. Newly installed zones shall have purple pipe.

L 411.4 Irrigation Control Systems. Where installed as part of a landscape irrigation system, irrigation control systems shall:

(1) Automatically adjust the irrigation schedule to respond to plant water needs determined by weather or soil moisture conditions. Shall be listed to the EPA WaterSense Specification for Weather-Based Irrigation Controllers or the EPA WaterSense Specification for Soil Moisture-Based Irrigation Controllers.
(2) Utilize onsite sensors or remote weather data to inhibit or to suspend irrigation when adequate soil moisture is present or during a rainfall or freezing conditions.
(3) Utilize either one or more on-site sensors or a weather-based irrigation controller listed to the US EPA WaterSense Weather Based Irrigation Controllers Specification to suspend irrigation where adequate soil moisture is present for plant growth.
(4) Have the capability to program multiple and different run times for each irrigation zone to enable cycling of water applications and durations to mitigate water flowing off of the intended irrigation zone.
(5) Be capable of indicating to the user when it is not receiving a signal or local sensor input.
(6) Be capable of allowing for a manual operation troubleshooting test cycle and shall automatically return to sensor input mode within some period of time as designated by the manufacturer, even when the switch is still positioned for manual operation.

(67) 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:
(a) Precipitation rate for each zone.
(b) Plant evapotranspiration coefficients for each zone.
(c) Soil absorption rate for each zone.
(d) Rain sensor settings.
(e) Soil moisture setting.
(f) Peak demand schedule including run times for each zone and the number of cycles to mitigate runoff and monthly adjustments or percentage change from peak demand schedule.

L 411.5 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 applications and durations to mitigate water flowing off of the intended irrigation zone.

L 411.5 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 applications and durations to mitigate water flowing off of the intended irrigation zone.

L 411.5 Low Flow Irrigation. Irrigation zones using low flow irrigation emitters with emitter flow rates not to exceed 6.3 gallons (24 L) per hour shall comply with ASABE/ICC 802 Landscape Irrigation Sprinkler and Emitter Standard and shall be equipped with filters sized according to the manufacturer’s recommendation for the specific low flow emitter, and with a pressure regulator installed upstream of the irrigation emission devices as necessary to reduce the operating water pressure in accordance with the manufacturers’ equipment requirements.

L 411.6 Mulched Planting Areas. Only low flow emitters with flow rates not to exceed 6.3 gallons (24 L) per hour are allowed to be installed in mulched planting areas with vegetation taller than 12 inches (305 mm).

L 411.7 System Performance Requirements. The landscape irrigation system shall be designed and installed to:
(1) Prevent irrigation water from runoff out of the irrigation zone.
(2) Prevent water in the supply line drainage from draining out between irrigation events.
(3) Not allow irrigation water to be applied onto or enter non-targeted areas including adjacent property and vegetation areas, adjacent hydrozones not requiring the irrigation water to meet its irrigation demand, non-vegetative areas, impermeable surfaces, roadways, and structures.

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

L 411.8 Narrow or Irregularly Shaped Landscape Areas. Narrow or irregularly shaped landscape areas, less than 4 feet (1219 mm) in any direction across opposing boundaries, shall not be irrigated by an irrigation emission device except low flow emitters with flow rates not to exceed 6.3 gallons (24 L) per hour.

L 411.9 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 (19.1 mm) per hour as verified through either of the following methods:
(1) Manufacturer documentation that the precipitation rate for the installed sprinkler head does not exceed 0.75 inches (19.1 mm) per hour where the sprinkler heads are installed not closer than the specified radius and where the water pressure of the irrigation system is not more than the manufacturer’s recommendations.
(2) Catch can test in accordance with the requirements of the Authority Having Jurisdiction and where emitted water volume is measured with a minimum of six 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 (mm/h).

L 411.9 Irrigation System Inspection and Performance Check. The irrigation system shall be inspected to verify compliance with the irrigation design in accordance with the following:
(1) 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.
(2) Sprinklers shall be installed as specified with proper spacing and required nozzle.
(3) Sprinklers shall be activated and visually inspected for covering areas without causing overspray or runoff.
(4) Valves shall be installed as specified.
(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.
(6) Control system shall be installed as specified and listed as a US EPA WaterSense labeled controller, and all sensors shall be installed and verified for proper installation and operation.
(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.
(8) Record drawings of the irrigation system shall be completed and provided for the irrigation inspection.
(9) An inspection report shall be provided to the property owner or management company identifying problems and what corrective actions are required.

L 411.10.1 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 6 percent as labeled or declared in manufacturer's published performance data).

L 411.10.4 Sprinkler Head Maximum Precipitation Rate. Where the slope of the landscape exceeds 25 percent, the precipitation rate of sprinkler heads shall not exceed 1.75 inches (44 mm) per hour when tested to ASABE/ICC 802.

L 411.11 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 inch per hour (25.4 mm/h) as verified through either of the following methods:

- Manufacturer's documentation that the precipitation rate for the installed sprinkler head does not exceed 1 inch per hour (25.4 mm/h) where the sprinkler heads are installed not closer than the specified radius and where the water pressure of the irrigation system is not more than the manufacturer's recommendations.
- Catch can test in accordance with the requirements of the Authority Having Jurisdiction and where emitted water volume is measured with a minimum of six 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 (mm/h).

L 411.11 Outside Hose Bibbs. Outside hose bibbs shall be allowed on irrigation pipe downstream of the backflow preventer. Hose bibbs supplying water from the irrigation system shall be indicated by posted signs marked with the words: “CAUTION: NONPOTABLE WATER. DO NOT DRINK” and the symbol in Figure 1505.9 of this code.

L 411.12 Qualifications. The Authority Having Jurisdiction shall have the authority to require landscape irrigation contractors, installers, or designers to demonstrate competency. Where required by the Authority Having Jurisdiction, the contractor, installer, or designer shall be certified to perform such work.

L 501.2.2 Building Cavities. Building cavities used for hot water supply and return piping shall be large enough to accommodate the combined diameter of the pipe plus the insulation, plus any other objects in the cavity that the piping must cross.

L 502.7 Maximum Volume and Length of Hot Water. The maximum volume of water contained in a hot water branch distribution pipe shall be in accordance with Section L 502.7.1, or Section L 502.7.2. The water volume shall be calculated using Table L 502.7. The maximum length per volume of piping shall comply with Section L 502.7.2.

L 502.7.1 Maximum Volume of Hot Water in a Branch Without Recirculation or Heat Trace. The maximum volume of water contained in hot water distribution pipe between the water heater and any fixture fitting shall not exceed 32 ounces (oz) (946 mL). Where a fixture fitting shutoff valve (supply stop) is installed ahead of the fixture fitting, the maximum volume of water is permitted to be calculated between the water heater and the fitting shut-off valve (supply stop). The water volume per foot of piping shall be calculated using Table L 502.7.1. The maximum volume of water in a fixture branch between 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:

- 1) 24 oz (708 mL) where a single branch serves a single fixture.
- 2) 40 oz (1183 mL) where a series branch incorporating one or more flow-through design configurations that serves two or more fixtures.
- 3) 60 oz (1774 mL) where a ring branch incorporating two or more flow-through design configurations that serves two or more fixtures.

Exceptions:

- 1) The maximum volume of 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 contain more than 40 oz (1183 mL).
- 2) The maximum volume of a single branch to a standalone tub shall not contain more than 80 oz (2366 mL).

L 502.7.2 Maximum Length Per Volume of Water in a Branch Volume of Hot Water with Recirculation or Heat Trace. The maximum volume of water contained in the branches between the recirculation loop or electrically heat traced pipe, and the fixture fitting shall not exceed 16 oz (473 mL). Where a fixture fitting shutoff valve (supply stop) is installed ahead of the fixture fitting, the maximum volume of water is permitted to be calculated between the recirculation loop or electrically heat traced pipe and the fixture fitting.
loop or electrically, heat traced pipe and the fixture fitting shut-off valve (supply stop).

**Exception:** Whirlpool bathtubs or bathtubs that are not equipped with a shower are exempted from the requirements of Section L 502.7. For fixture branches in accordance with Section 1003.7.1, the maximum length of piping shall be calculated using Table L 502.7.2(1) through Table 502.7.2(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).

### TABLE L 502.7.1
WATER VOLUME FOR DISTRIBUTION PIPING MATERIALS

<table>
<thead>
<tr>
<th>NOMINAL SIZE (inch)</th>
<th>COPPER TYPE M</th>
<th>COPPER TYPE L</th>
<th>COPPER TYPE K</th>
<th>CPVC CTS SDR 11</th>
<th>CPVC SCH 40</th>
<th>PEX-AL-PEX</th>
<th>PE-AL-PE</th>
<th>CPVC SCH 80</th>
<th>PEX CTS SDR 9</th>
<th>PE-RT SDR 9</th>
<th>PP SDR 6</th>
<th>PP SDR 7.3</th>
<th>PP SDR 11</th>
<th>CPVC PIPE SDR 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>1.06</td>
<td>0.97</td>
<td>0.84</td>
<td>NA</td>
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<td>½</td>
<td>1.69</td>
<td>1.55</td>
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<td>1.235</td>
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<td>1.2244</td>
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<tr>
<td>¾</td>
<td>3.43</td>
<td>3.22</td>
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<td>5.83</td>
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</tbody>
</table>

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

### TABLE L 502.7.2(1)
LENGTH (FT) PER VOLUME OF PIPING

<table>
<thead>
<tr>
<th>NOMINAL SIZE (inch)</th>
<th>COPPER TYPE M</th>
<th>COPPER TYPE L</th>
<th>COPPER TYPE K</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 OZ</td>
<td>40 OZ</td>
<td>60 OZ</td>
</tr>
<tr>
<td>3/8</td>
<td>22.7</td>
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<tr>
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</table>

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

### TABLE L 502.7.2 (2)
LENGTH (FT) PER VOLUME OF PIPING

<table>
<thead>
<tr>
<th>NOMINAL SIZE (inch)</th>
<th>CPVC CTS SDR 11</th>
<th>CPVC SCH 40 PIPE</th>
<th>CPVC SCH 80 PIPE</th>
<th>CPVC SDR 11 PIPE</th>
</tr>
</thead>
<tbody>
<tr>
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<td>24 OZ</td>
<td>40 OZ</td>
<td>60 OZ</td>
<td>24 OZ</td>
</tr>
<tr>
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<td>35.5</td>
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<td>½</td>
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<tr>
<td>¾</td>
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<td>23.8</td>
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</tr>
<tr>
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<td>2</td>
<td>1.6</td>
<td>2.6</td>
<td>3.9</td>
<td>1.1</td>
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</tbody>
</table>

For SI units: 1 foot = 304.8 mm, 1 ounce = 29.573 mL
TABLE L 502.7.2 (3)  
LENGTH (FT) PER VOLUME OF PIPING

<table>
<thead>
<tr>
<th>NOMINAL SIZE, inches (DN)*</th>
<th>PEX &amp; PE-RT CTS SDR 9</th>
<th>PEX-AL-PEX (DN)</th>
<th>PE-AL-PE (DN)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 OZ</td>
<td>40 OZ</td>
<td>60 OZ</td>
</tr>
<tr>
<td>3/8(12)</td>
<td>37.5</td>
<td>62.5</td>
<td>93.8</td>
</tr>
<tr>
<td>1/2(16)</td>
<td>20.4</td>
<td>33.9</td>
<td>50.9</td>
</tr>
<tr>
<td>3/4(25)</td>
<td>10.2</td>
<td>17.0</td>
<td>25.5</td>
</tr>
<tr>
<td>1(32)</td>
<td>6.2</td>
<td>10.3</td>
<td>15.5</td>
</tr>
<tr>
<td>11/4(40)</td>
<td>4.1</td>
<td>6.9</td>
<td>10.3</td>
</tr>
<tr>
<td>11/2(50)</td>
<td>3.0</td>
<td>4.9</td>
<td>7.4</td>
</tr>
<tr>
<td>2(63)</td>
<td>1.7</td>
<td>2.9</td>
<td>4.3</td>
</tr>
</tbody>
</table>

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

* DN is outside diameter

TABLE L 502.7.2 (4)  
LENGTH (FT) PER VOLUME OF PIPING

<table>
<thead>
<tr>
<th>NOMINAL SIZE, inches (DN)</th>
<th>PP SDR 6 (DN)</th>
<th>PP SDR 7.3 (DN)</th>
<th>PP SDR 11 (DN)1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 OZ</td>
<td>40 OZ</td>
<td>60 OZ</td>
</tr>
<tr>
<td>3/8(16)</td>
<td>28.2</td>
<td>46.9</td>
<td>70.4</td>
</tr>
<tr>
<td>1/2(20)</td>
<td>17.7</td>
<td>29.6</td>
<td>44.3</td>
</tr>
<tr>
<td>3/4(25)</td>
<td>11.2</td>
<td>18.7</td>
<td>28.0</td>
</tr>
<tr>
<td>1(32)</td>
<td>6.9</td>
<td>11.6</td>
<td>17.3</td>
</tr>
<tr>
<td>11/4(40)</td>
<td>4.4</td>
<td>7.3</td>
<td>11.0</td>
</tr>
<tr>
<td>11/2(50)</td>
<td>2.8</td>
<td>4.6</td>
<td>6.9</td>
</tr>
<tr>
<td>2(63)</td>
<td>1.8</td>
<td>2.9</td>
<td>4.4</td>
</tr>
</tbody>
</table>

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

Notes:
1 PP SDR 11 products are not typically used or rated at 180°F
2 DN is outside diameter

L 503.3.3 Service Hot Water Piping Insulation. Insulation of hot water and return piping shall meet the provisions in Section L 501.2. The following piping shall be insulated in accordance with Table L 503.3.3:

1. Recirculating system piping, including the supply and return piping of a circulating tank type water heater.
2. The first 8 feet (2438 mm) of outlet piping for a constant temperature nonrecirculating storage system.
3. The first 8 feet (2438 mm) of branch piping connecting to recirculated, heat-traced, or impedance heated piping.
4. The inlet piping between the storage tank and a heat trap in a nonrecirculating storage system.
5. Piping that is externally heated (such as heat trace or impedance heating). [ASHRAE 90.1:7.4.3]

TABLE L 503.3.3  
MINIMUM PIPING INSULATION THICKNESS FOR HEATING AND HOT-WATER SYSTEMS (STEAM, STEAM CONDENSATE, HOT-WATER HEATING, AND DOMESTIC WATER SYSTEMS) [ASHRAE 90.1: TABLE 6.8.3-1]

<table>
<thead>
<tr>
<th>FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)</th>
<th>INSULATION CONDUCTIVITY CONDUCTIVITY Btu•inch/(h•ft•°F)</th>
<th>MEAN RATING TEMPERATURE (°F)</th>
<th>≥NOMINAL PIPE SIZE OR TUBE SIZE (inches)</th>
<th>INSULATION THICKNESS (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;350</td>
<td>0.32 to 0.34</td>
<td>260</td>
<td>4.5</td>
<td>5.0</td>
</tr>
<tr>
<td>261 to 350</td>
<td>0.29 to 0.32</td>
<td>200</td>
<td>3.0</td>
<td>4.0</td>
</tr>
<tr>
<td>201 to 250</td>
<td>0.27 to 0.30</td>
<td>150</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>141 to 200</td>
<td>0.25 to 0.29</td>
<td>125</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>105 to 140</td>
<td>0.22 to 0.28</td>
<td>100</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

353
For SI units: °C=(°F-32)/1.8, 1 British thermal unit inch per hour square foot degree Fahrenheit = [0.1 W/(m•K)], 1 inch = 25 mm

Notes:
1. For insulation outside the stated conductivity range, the minimum thickness (T) shall be determined as follows:
   \[ T = \frac{r}{(1 + \frac{t}{r})K/k - 1} \]
   Where:
   \( T \) = minimum insulation thickness (inches) (mm).
   \( r \) = actual outside radius of pipe (inches) (mm).
   \( t \) = insulation thickness listed in this table for applicable fluid temperature and pipe size.
   \( K \) = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature [Btu/(h•ft²•°F)] [W/(m•K)].
   \( k \) = the upper value of the conductivity range listed in this table for the applicable fluid temperature.
2. These thicknesses are based on energy efficiency considerations only. Additional insulation is sometimes required relative to safety issues or surface temperature.
3. For piping 11/2 inches (40 mm) or less, and located in partitions within conditioned spaces, reduction of insulation thickness by 1 inch (25.4 mm) shall be permitted before thickness adjustment required in Footnote 1, but not a thickness less than 1 inch (25.4 mm).
4. For direct-buried heating and hot water system piping, reduction of insulation thickness by 11/2 inch (38 mm) shall be permitted before thickness adjustment required in Footnote 1, but not a thickness less than 1 inch (25.4 mm).
5. Table L 503.3.3 is based on steel pipe. Non-metallic pipes, Schedule 80 thickness or less shall use the table values. For other non-metallic pipes having a thermal resistance more than that of steel pipe, reduced insulation thicknesses shall be permitted where documentation is provided showing that the pipe with the proposed insulation has no more heat transfer per foot (mm) than a steel pipe of the same size with the insulation thickness shown in Table L 503.3.3

TABLE L 701.2(1)
WATER USE BASELINE

<table>
<thead>
<tr>
<th>FIXTURE TYPE</th>
<th>MAXIMUM FLOW-RATE CONSUMPTION2</th>
<th>DURATION</th>
<th>ESTIMATED DAILY USES PER PERSON</th>
<th>OCCUPANTS3, 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Showerheads</td>
<td>2.5 gpm at 80 psi</td>
<td>8 minutes</td>
<td>1</td>
<td>–</td>
</tr>
<tr>
<td>Private or Private-Use Lavatory Faucets</td>
<td>2.2 gpm at 60 psi</td>
<td>0.25 minutes</td>
<td>4</td>
<td>–</td>
</tr>
<tr>
<td>Residential Kitchen Faucets</td>
<td>2.2 gpm at 60 psi</td>
<td>4 minutes</td>
<td>4</td>
<td>–</td>
</tr>
<tr>
<td>Wash Fountains</td>
<td>One 2.2 gpm at 60 psi fixture fitting for every 20 inches rim space</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Lavatory Faucets in other than Residences, Apartments, and Private Bathrooms in Lodging Facilities</td>
<td>0.5 gpm</td>
<td>0.25 minutes</td>
<td>4</td>
<td>–</td>
</tr>
<tr>
<td>Metering Faucets</td>
<td>0.25 gallons/cycle</td>
<td>–</td>
<td>3</td>
<td>–</td>
</tr>
<tr>
<td>Metering Faucets for Wash Fountains</td>
<td>One 0.25 gallon per cycle fixture fitting for every 20 inches rim space</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Water Closets</td>
<td>1.6 gallons per flush</td>
<td>1-flush</td>
<td>1-male1</td>
<td>–</td>
</tr>
<tr>
<td>Urinals</td>
<td>1.0 gallons per flush</td>
<td>1-flush</td>
<td>2-male</td>
<td>–</td>
</tr>
</tbody>
</table>

For SI units: 1 gallon per minute = 0.06 L/s, 1 pound-force per square inch = 6.8947 kPa, 1 gallon = 3.785 L, 1 inch = 25.4 mm
Notes:
1. The daily use number shall be increased to three where urinals are not installed in the room.
2. The maximum flow rate or consumption is from the Energy Policy Act.
3. For residential occupancies, the number of occupants shall be based on two persons for the first bedroom and one additional person for each additional bedroom.
4. For nonresidential occupancies, refer to Table 422.1 for occupant load factors.
5. Where determining calculations, assume one use per person for metering or self-closing faucets.

<table>
<thead>
<tr>
<th>TABLE L-701.2(2)</th>
<th>WATER SAVINGS CALCULATOR$^1, 2, 3$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NONRESIDENTIAL BUILDINGS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>FIXTURE TYPE</strong></td>
<td><strong>CONSUMPTION (gallons per minute)</strong></td>
</tr>
<tr>
<td>1.6 gpf (gallons-per-flush)</td>
<td>1.6</td>
</tr>
<tr>
<td>toilet—male</td>
<td></td>
</tr>
<tr>
<td>1.6 gpf toilet—female</td>
<td>1.6</td>
</tr>
<tr>
<td>1.0 gpf urinal—male</td>
<td>1</td>
</tr>
<tr>
<td>Commercial lavatory faucet</td>
<td>0.5</td>
</tr>
<tr>
<td>0.5 gpm</td>
<td></td>
</tr>
<tr>
<td>Kitchen sink—2.2 gpm</td>
<td>2.2</td>
</tr>
<tr>
<td>Showerhead—2.5 gpm</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total Daily Volume</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Annual Work Days</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Total Annual Usage</strong></td>
<td></td>
</tr>
</tbody>
</table>

| **NONRESIDENTIAL BUILDINGS** |
| **FIXTURE TYPE** | **CONSUMPTION (gallons per minute)** | **DAILY USES** | **DURATION (minutes)** | **OCCUPANTS** | **DAILY WATER USES (gallons)** |
| 1.6 gpf toilet—male | 1.28 | 4 | 1 | 150 | 492 |
| 1.6 gpf toilet—female | 1.28 | 3 | 1 | 150 | 576 |
| 1.0 gpf urinal—male | 0.5 | 2 | 1 | 150 | 143 |
| Commercial lavatory faucet | 0.5 | 3 | 0.25 | 300 | 165 |
| 0.5 gpm | | | | | |
| Kitchen sink—2.2 gpm | 2.2 | 1 | 0.25 | 300 | 600 |
| Showerhead—2.5 gpm | 2.5 | 0.1 | 8 | 300 | 600 |
| **Total Daily Volume** | | | | | 1796 |
| **Annual Work Days** | | | | | 260 |
| **Total Annual Usage** | | | | | 466,830 |
| **Annual Savings** | | | | | 88,920 |
| **% Reduction** | | | | | -16.0 percent |

For SI units: 1 gallon per minute = 0.06 L/s, 1 gallon = 3.785 L

Notes:
$^1$ Consumption values shown as underlined reflect the maximum consumption values associated with the provisions called out in the IAPMO Green Plumbing & Mechanical Code Supplement.
$^2$ Where metering faucets are used, insert the flow rate of the faucet in the “Consumption” column and insert the cycle time in the “Duration” column (assume 1 cycle per use).
$^3$ To determine estimated savings, insert occupant values (same as Baseline) and consumption values based on fixtures and fixture fittings installed.
### NATIONAL ENERGY PERFORMANCE STANDARD FOR BUILDINGS CODE ADDRESSING CLIMATE CHANGE

#### WATER SAVINGS CALCULATOR

**NONRESIDENTIAL BUILDINGS**

<table>
<thead>
<tr>
<th>FIXTURE-TYPE</th>
<th>CONSUMPTION (gallons per minute)</th>
<th>DAILY USES</th>
<th>DURATION (minutes)</th>
<th>OCCUPANTS</th>
<th>DAILY WATER USES (gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.6 gpf toilets</td>
<td>1.6</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>32</td>
</tr>
<tr>
<td>Lavatory faucet - 2.2 gpm</td>
<td>2.2</td>
<td>8</td>
<td>0.25</td>
<td>4</td>
<td>48</td>
</tr>
<tr>
<td>Kitchen-sink - 2.2 gpm</td>
<td>2.2</td>
<td>6</td>
<td>0.25</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Showerhead - 2.5 gpm</td>
<td>2.5</td>
<td>0.75</td>
<td>8</td>
<td>4</td>
<td>60</td>
</tr>
<tr>
<td><strong>Total Daily Volume</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>123</td>
</tr>
<tr>
<td><strong>Annual Work Days</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>44 822</td>
</tr>
</tbody>
</table>

**NONRESIDENTIAL BUILDINGS**

<table>
<thead>
<tr>
<th>FIXTURE-TYPE</th>
<th>CONSUMPTION (gallons per minute)</th>
<th>DAILY USES</th>
<th>DURATION (minutes)</th>
<th>OCCUPANTS</th>
<th>DAILY WATER USES (gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.6 gpf toilet - male</td>
<td>1.28</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>Lavatory faucet - 1.5 gpm</td>
<td>1.5</td>
<td>8</td>
<td>0.25</td>
<td>4</td>
<td>42</td>
</tr>
<tr>
<td>Kitchen-sink - 2.2 gpm</td>
<td>2.2</td>
<td>6</td>
<td>0.25</td>
<td>4</td>
<td>43</td>
</tr>
<tr>
<td>Showerhead - 2.5 gpm</td>
<td>2.5</td>
<td>0.75</td>
<td>8</td>
<td>4</td>
<td>60</td>
</tr>
<tr>
<td><strong>Total Daily Volume</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>111</td>
</tr>
<tr>
<td><strong>Annual Usage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40 442</td>
</tr>
<tr>
<td><strong>Annual Savings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4380</td>
</tr>
<tr>
<td><strong>% Reduction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-9.8 percent</td>
</tr>
</tbody>
</table>

For SI units: 1 gallon per minute = 0.06 L/s, 1 gallon = 3.785 L

**Notes:**
1. Consumption values shown as underlined reflect the maximum consumption values associated with the provisions called out in the IAPMO Green Plumbing & Mechanical Code Supplement.
2. To determine estimated savings, insert occupant values (same as Baseline) and consumption values based on fixtures and fixture fittings installed.

**Notes and instructions for Table L 701.2(2):**

Table L-701.2(2) is an example of a calculator that is capable of helping estimate water savings in residential and nonresidential structures. The “Duration” of use and “Daily Uses” values that appear in the table are estimates and based on previous studies. The first example shown below is a commercial office building with 300 occupants, 150 females, and 150 males. The second example is a 3 bedroom residential building. To obtain and use a working copy of this calculator, follow these instructions:

**Instructions for download:**
1. Go to the IAPMO website at www.iapmogreen.org to download the water savings calculator. The calculator is a Microsoft Office Excel file (1997 or later); your computer must be capable of running MS Excel.
2. Follow the instructions for downloading and running the file.

**Instructions for use:**
1. In the Baseline Case section, insert the number of total occupants, male occupants and female occupants that apply to the building in the “Occupants” column. Unless specific gender ratio values are provided, assume a 50/50 gender ratio.
2. Copy and paste these same values in the “Occupants” column of the Calculator section.
3. In the Calculator section, insert the consumption values (flow rates in gpm or gallons per flush or per cycle) in the “Consumption” column.
4. Estimated water savings regarding percent savings versus baseline values, gallons per day and gallons per year will be automatically calculated.
<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASABE/ICC 802-2014</td>
<td>Landscape Irrigation Sprinkler and Emitter Standard</td>
<td>Irrigation</td>
</tr>
<tr>
<td>Energy Star-2007</td>
<td>Program Requirements for Commercial Ice Machines</td>
<td>Miscellaneous</td>
</tr>
<tr>
<td>EPA WaterSense-2017</td>
<td>Specifications for Weather-Based Irrigation Controllers</td>
<td>Miscellaneous</td>
</tr>
<tr>
<td>WQA/ASPE/ANSI S-803-2017</td>
<td>Sustainable Drinking Water Treatment Systems</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**

The proposed changes to Appendix L are still updates correlate with the latest edition of the WeStand. However, the proposed change takes into consideration the Technical Committees concerns in this updated comment.

The provisions for zero leak tolerance for diverters in Section L 402.6.2 (Bath and Shower Diverters) has been removed and only the editorial changes have been implemented. Section L 406.2.3.1 (Markings) regarding markings on control valves has been revised to marked in accordance with applicable standards as this will avoid conflicts. The requirements in Table L 407.1 for required metering in swimming pools has been removed as the TC was concerned about the size.

All other sections proposed were double checked against the latest WeStand and latest 2021 UPC ROP Pre-print to ensure all changes that have been accepted by the UPC TC have been implemented in this updated comment. This proposed change will bring the UPC into alignment for the many updates implemented into the WeStand and we urge the TC to accept these updates.
Proposals

Item #: 289

UPC 2024  Section: L 201.0, L 503.2 - L 503.4.5, Table 1701.2

SUBMITTER:  IAPMO Staff - Update Extracts
ASHRAE 90.1 Extract Update

RECOMMENDATION:
Revise text

L 201.0 Definitions.
On-Site Renewable Energy. Energy from renewable energy resources harvested at the building site. [ASHRAE 90.1:3.2]

Renewable Energy Resources. Energy from solar, wind, biomass or hydro, or extracted from hot fluid or steam heated within the earth. [ASHRAE 90.1:3.2]

L 503.2 Compliance Paths. Service water heating systems and equipment shall comply with Section L 503.2.1 and Section L 503.2.2.

L 503.2.1 Requirements for All Compliance Path(s). Compliance shall be achieved in accordance with the requirements of Service water heating systems and equipment shall comply with Section L 503.1, Section L 503.3, Section L 503.4 and L 503.5. [ASHRAE 90.1:7.2.1]

L 503.2.2 Additional Requirements for Service Water Heating. Service water heating systems and equipment shall comply with Section L 503.4.1 through Section L 503.4.3. [ASHRAE 90.1:7.2.2]

L 503.3.1 Load Calculations. Service water-heating system design loads for the purpose of sizing systems and equipment shall be determined in accordance with manufacturer’s published sizing guidelines or generally accepted engineering standards and handbooks acceptable to the adopting authority (e.g., ASHRAE Handbook – HVAC Applications). [ASHRAE 90.1:7.4.1]

L 503.3.6 Pools. Pool heating systems shall comply with Section L 503.3.6(1) through Section L 503.3.6(3).
(1) Pool heaters shall be equipped with a readily accessible ON/OFF switch to allow shutting off the heater without adjusting the thermostat setting. Pool heaters fired by natural gas shall not have continuously burning pilot lights. [ASHRAE 90.1:7.4.5.1]
(2) Heated pools shall be equipped with a vapor retardant pool cover on or at the water surface. Pools heated to more than 90°F (32°C) shall have a pool cover with a minimum insulation value of R-12. Exception: Pools that are deriving over 60 percent of the energy for heating from site-recovered energy or solar energy on-site renewable energy. [ASHRAE 90.1:7.4.5.2]
(3) Time switches shall be installed on swimming pool heaters and pumps.
Exceptions:
(1) Where public health standards require 24-hour pump operation.
(2) Where pumps are required to operate solar and waste heat recovery pool heating systems. [ASHRAE 90.1:7.4.5.3]

L 503.4.2 Service Water Heating Equipment. Service water-heating equipment used to provide the additional function of space heating as part of a combination (integrated) system shall satisfy all stated requirements for the service water-heating equipment. [ASHRAE 90.1:7.5.2]
L 503.4.3 Buildings with High-Capacity Service Water-Heating Systems. New buildings with gas service hot-water-heating systems with a total installed gas water-heating input capacity of 1 000 000 Btu/h (293 kW) or more, shall have gas service water-heating equipment with a thermal efficiency \( E_t \) of not less than 90 percent. Multiple units of gas water-heating equipment shall be permitted to comply with this requirement where the water-heating input provided by the equipment, with thermal efficiency \( E_t \) of more or less than above and below 90 percent, provides an input capacity-weighted average thermal efficiency of not less than 90 percent.

Exceptions:
(1) Where 25 percent of the annual service water-heating requirement is provided by site-solar on-site renewable energy or site-recovered energy.
(2) Water heaters installed in individual dwelling units.
(3) Individual gas water heaters with input capacity, not more than 100 000 Btu/h (29.3 kW). [ASHRAE 90.1:7.5.3]

L 503.4.4 Heat Recovery for Service Water Heating. Condenser heat recovery systems shall be installed for heating or preheating of service hot water provided all of the following are true:
(1) The facility operates 24 hours a day.
(2) The total installed heat rejection capacity of the water-cooled systems exceeds 6 000 000 Btu/h (1758 kW) of heat rejection.
(3) The design service water-heating load exceeds 1 000 000 Btu/h (293 kW). [ASHRAE 90.1:6.5.6.2.1]

L 503.4.5 Capacity. The required heat recovery system shall have the capacity to provide the smaller of:
(1) Sixty percent of the peak heat-rejection load at design conditions.
(2) Preheat of the peak service hot-water draw to 85°F (29°C).

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

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### TABLE L 503.3.2

**PERFORMANCE REQUIREMENTS FOR WATER-HEATING EQUIPMENT MINIMUM EFFICIENCY REQUIREMENTS**

[ASHRAE 90.1: TABLE 7.8]

<table>
<thead>
<tr>
<th>EQUIPMENT TYPE</th>
<th>SIZE CATEGORY (INPUT)</th>
<th>SUBCATEGORY OR RATING CONDITION</th>
<th>PERFORMANCE REQUIRED</th>
<th>TEST PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric table-top</td>
<td>&lt;=12 kW</td>
<td>Resistance &lt;4000 (Btu/h)/gal and &lt;=20 gal</td>
<td>See footnote 7</td>
<td>—</td>
</tr>
<tr>
<td>water heaters</td>
<td></td>
<td>and &lt;=120 gal</td>
<td></td>
<td>Appendix E of 10 CFR 430</td>
</tr>
<tr>
<td></td>
<td>&lt;=12 kW5</td>
<td>Resistance &gt;=20 gal</td>
<td>See footnote 7</td>
<td>—</td>
</tr>
<tr>
<td>Electric water</td>
<td>&gt;12 kW5</td>
<td>Resistance &lt;=20 gal</td>
<td></td>
<td>Section G.2 of CSA Z21.10.3</td>
</tr>
<tr>
<td>heaters</td>
<td>&lt;=24 Amps and &lt;=260 Volts</td>
<td>Heat Pump</td>
<td>See footnote 7</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>&gt;12 kW</td>
<td>&gt;4000 (Btu/h)/gal &gt;55 gal</td>
<td>For applications outside U.S. see footnote 8, For U.S applications, see footnote (7).</td>
<td>Appendix E of 10 CFR 430</td>
</tr>
<tr>
<td>Electric storage</td>
<td>&lt;=12 kW</td>
<td>&gt;4000 (Btu/h)/gal &gt;55 gal and &lt;=120 gal</td>
<td>For applications outside U.S. see footnote 8, For U.S applications, see footnote (7).</td>
<td>Appendix E of 10 CFR 430</td>
</tr>
<tr>
<td>water heaters</td>
<td>&gt;12 kW</td>
<td>&lt;4000 (Btu/h)/gal SL &lt;= 0.3 + 27/Vm %/h</td>
<td>10 CFR 431.106</td>
<td>—</td>
</tr>
<tr>
<td>Electric instantaneous</td>
<td>&lt;=12 kW</td>
<td>&gt;4000 (Btu/h)/gal &lt;=2 gal</td>
<td>For applications outside US. see footnote 8, For US applications, see footnote (7).</td>
<td>Appendix E of 10 CFR 430</td>
</tr>
<tr>
<td>water heaters</td>
<td>&gt;12 kW and &lt;=58.6 kW5</td>
<td>&gt;4000 (Btu/h)/gal &lt;=2 gal &lt;=180°F</td>
<td>Very Small DP: UEF = 0.80 Low DP: UEF = 0.80 Medium DP: UEF =</td>
<td>Appendix E of 10 CFR 430</td>
</tr>
<tr>
<td>Gas storage water heaters</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;(=58.6\text{ kW}^3)</td>
<td>High DP: UEF = 0.80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;(=4000\text{ (Btu/h)/gal})</td>
<td>No requirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 gal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;(=4000\text{ (Btu/h)/gal})</td>
<td>No requirement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(&gt;10\text{ gal})</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[\begin{align*} \text{Very Small DP: } & UEF = 0.2674 - (0.0009 \times V_r) \\
\text{Low DP: } & UEF = 0.5362 - (0.0012 \times V_r) \\
\text{Medium DP: } & UEF = 0.6002 - (0.0011 \times V_r) \\
\text{High DP: } & UEF = 0.6597 - (0.0009 \times V_r) \end{align*}\]

<table>
<thead>
<tr>
<th>Gas instantaneous water heaters</th>
<th>0.59 - 0.0005(V\ EF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\leq75\text{ 000 Btu/h})</td>
<td>For applications outside U.S., see footnote (8). For U.S. applications, see footnote (7).</td>
</tr>
<tr>
<td>&lt;(4000\text{ (Btu/h)/gal})</td>
<td></td>
</tr>
<tr>
<td>(\geq20\text{ gal}) and (&lt;\leq55\text{ gal})</td>
<td></td>
</tr>
<tr>
<td>(\geq4000\text{ (Btu/h)/gal})</td>
<td></td>
</tr>
<tr>
<td>(&lt;\leq100\text{ gal})</td>
<td></td>
</tr>
</tbody>
</table>

\[\begin{align*} \text{80\% Et}_{\text{SL}} & \leq (Q/800 + 110v \sqrt{V})_{\text{SL}}, \text{ Btu/h} \end{align*}\]

<table>
<thead>
<tr>
<th>Oil storage water heaters</th>
<th>0.69 - 0.0005(V\ EF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\leq105\text{ 000 Btu/h})</td>
<td>For applications outside U.S., see footnote (8). For U.S. applications, see footnote (7).</td>
</tr>
<tr>
<td>&gt;(\geq4000\text{ (Btu/h)/gal})</td>
<td></td>
</tr>
<tr>
<td>(&lt;\leq50\text{ gal})</td>
<td></td>
</tr>
</tbody>
</table>

\[\begin{align*} \text{80\% Et}_{\text{SL}} & \leq (Q/800 + 16.6v \sqrt{V})_{\text{SL}}, \text{ Btu/h} \end{align*}\]

<table>
<thead>
<tr>
<th>Oil instantaneous water heaters</th>
<th>0.59 - 0.0005(V\ EF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\leq210\text{ 000 Btu/h})</td>
<td>For applications outside U.S., see footnote (8). For U.S. applications, see footnote (7).</td>
</tr>
<tr>
<td>&gt;(\geq4000\text{ (Btu/h)/gal})</td>
<td></td>
</tr>
<tr>
<td>(&lt;\leq2\text{ gal})</td>
<td></td>
</tr>
</tbody>
</table>

\[\begin{align*} \text{80\% Et}_{\text{EF}} & \geq 0.59 - 0.0005 \times V \end{align*}\]
<table>
<thead>
<tr>
<th>Hot-water supply boilers, gas and oil</th>
<th>Hot-water supply boilers, gas</th>
<th>Hot-water supply boilers, oil</th>
<th>Pool heaters, oil and gas</th>
<th>Heat pump pool heaters</th>
<th>Unfired storage tanks</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;210 000 Btu/h and &lt;10 gal</td>
<td>&gt;300 000 Btu/h and &lt;12 500 000 Btu/h</td>
<td>&gt;300 000 Btu/h and &lt;12 500 000 Btu/h</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>&gt;4000 (Btu)/gal and &gt;=10 gal</td>
<td>&gt;4000 (Btu)/gal and &gt;=10 gal</td>
<td>&gt;4000 (Btu)/gal and &gt;=10 gal</td>
<td>—</td>
<td>50°F db 44.2°F wb</td>
<td>—</td>
</tr>
<tr>
<td>78% Et SL &lt;= (Q/800 + 110vV/SL, Btu/h)</td>
<td>80% Et SL &lt;= (Q/800 + 110vV/SL, Btu/h)</td>
<td>78% Et SL &lt;= (Q/800 + 110vV/SL, Btu/h)</td>
<td>See footnote 7 ASHRAE 90.1 contains a complete specification, including the year version, of the referenced test procedure.</td>
<td>4.0 COP</td>
<td>R-12.5 (none)</td>
</tr>
</tbody>
</table>

Notes:
1. Thermal efficiency (Et) is a minimum requirement, while standby loss (SL) is a maximum Btu/h (kW) based on a 70°F (21°C) temperature difference between stored water and ambient requirements. In the SL equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h (kW). \( V_m \) is the measured volume in the tank in gallons. Standby loss for electric water heaters is in terms of Btu/h and denoted by the term “S,” and standby loss for gas and oil water heaters is in terms of Btu/h and denoted by the term “SL.” Draw pattern (DP) refers to the water draw profile in the Uniform Energy Factor (UEF) test. UEF and Energy Factor (EF) are minimum requirements. In the UEF standard equations, \( V_r \) refers to the rated volume in gallons.
2. ASHRAE 90.1 contains a complete specification, including the year version, of the referenced test procedure.
3. Electric instantaneous water heaters with input rates below capacity > 40 946 Btu/h (12 kW) and <= 200 000 Btu/h (58.6 kW) shall be in accordance with these requirements where the water heater either:
   (a) has a storage volume >2 gallons (7.6 L);
   (b) is designed to heat provide outlet hot water at temperatures of greater than 180°F (82°C); or
   (c) uses three phase power.
4. Electric water heaters with input rates less than 40 946 Btu/h (12 kW) shall be in accordance with these requirements where the water heater is designed to heat water to temperatures of 180°F (82°C) or higher.
5. Gas storage water heaters with input capacity >75 000 Btu/h (22 kW) and <=105 000 Btu/h (30.8 kW) must comply with the requirements for the >105 000 Btu/h (30.8 kW) if the water heater either:
   (a) has a storage volume >120 gallons (454 L);
   (b) is designed to provide outlet hot water at temperatures greater than 180°F (82.2°C); or
   (c) uses three-phase power.
6. Oil storage water heaters with input capacity >105 000 Btu/h (30.8 kW) and <=140 000 Btu/h (41.0 kW) must comply with the requirements for the >140 000 Btu/h (41.0 kW) if the water heater either:
   (a) has a storage volume >120 gallons (454 L);
   (b) is designed to provide outlet hot water at temperatures greater than 180°F (82.2°C); or
   (c) uses three-phase power.
7. Refer to Section L 503.4.3 for additional requirements for gas storage and instantaneous water heaters and gas hot-water supply boilers.
7. In the U.S., the efficiency requirements for water heaters or gas pool heaters in this category or subcategory are specified by the U.S. Department of Energy. Those requirements and applicable test procedures are found in the Code of Federal Regulations 10 CFR Part 430.

8. Water heaters or gas pool heaters in this category or subcategory are regulated as consumer products by the USDOE as defined in 10 CFR 430.

8. Where this standard is being applied to a building outside the U.S. and Canada and water heaters in this subcategory are being installed in that building, those water heaters shall meet the local efficiency requirements. If there are no local efficiency standards for residential water heaters, consideration should be given to using the USDOE efficiency requirements shown in Appendix F, Table F-2 of ASHRAE 90.1.

### TABLE 1701.2

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 CFR 430</td>
<td>Energy Conservation Program for Consumer Products</td>
<td>Energy Conservation</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The above sections have been revised to correlate with ASHRAE 90.1-2019 [ASHRAE 90.1-2019 - Addenda ck, cp] (latest version) in accordance with IAPMO's Regulations Governing Committee Projects (Extract Guidelines).

**COMMITTEE ACTION:** ACCEPT AS SUBMITTED

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 25 NOT RETURNED: 1  Daniels

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**APPENDED COMMENTS**

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**PUBLIC COMMENT 1**

**Code Year:** 2024  **UPC Section #:** L 201.0, L 503.4.3, L 503.4.5  **Item #:** 289

**SUBMITTER:** Emily Toto  ASHRAE  **Comment #:** 1

**RECOMMENDATION:**
Revise text

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

**L 201.0 Definitions.**

**On-Site Renewable Energy.** Energy generated from renewable energy resources harvested sources produced at the building site. [ASHRAE 90.1:3.2]

**L 503.4.3 Large Buildings with High-Capacity Service Water-Heating Systems.** New buildings with gas-service water-heating systems with a total installed gas water-heating input capacity of 1 000 000 Btu/h (293 kW) or greater, more, shall have gas-provided by high-capacity gas-fired service water-heating equipment with a shall meet either or both of the following requirements:

1. Where a single unit of high-capacity gas-fired service water-heating equipment is installed, it shall have a minimum thermal efficiency (Et) of not less than 90 percent.

2. Multiple units of high-capacity gas-fired service water-heating equipment shall be permitted to comply with this requirement where the connected to the same service water-heating system shall have a total input-capacity-weighted provided by the equipment, with average thermal efficiency (Et) above and below of at least 90 percent, provides an-and a minimum of 30 percent of the input of the high-capacity-weighted average gas-fired service water-heating equipment in the service water heating-system shall have a thermal efficiency (Et) of not less than 90 percent at least 92 percent.
High-capacity gas-fired service water-heating equipment comprises gas-fired instantaneous water heaters with a rated input both greater than 200,000 Btu/h (58.6 kW) and not less than 4000 Btu/h per gallon (310 W/L) of stored water, and gas-fired storage water heaters with a rated input both greater than 105,000 Btu/h (30.8 kW) and less than 4000 Btu/h per gallon (310 W/L) of stored water.

Exceptions:
(1) Where 25 percent of the annual service water-heating requirement is provided by on-site renewable energy or site-recovered energy.
(2) Water heaters installed in individual dwelling units.
(3) Individual gas water heaters with input capacity not more greater than 100,000 Btu/h (29.3 kW). [ASHRAE 90.1.7.5.3]

L 503.4.5 Capacity. The required heat recovery system shall have the capacity to provide the smaller of:
(1) Sixty percent of the peak heat-rejection load at design conditions or
(2) Preheat of the peak service hot-water draw to 85°F (29°C).

Exceptions:
(1) Facilities that employ condenser heat recovery for space heating with a heat recovery design exceeding 30 percent of the peak water-cooled condenser load at design conditions.
(2) Facilities that provide 60 percent of their service water heating from site-solar-on-site renewable energy or site-recovered energy or on-site renewable energy from other sources. [ASHRAE 90.1.6.5.6.2.2]

SUBSTANTIATION:
The above sections have been revised to correlate with ASHRAE 90.1-2019 [ASHRAE 90.1-2019 - Addenda ah, ck, and cp] (latest version) in accordance with IAPMO’s Regulations Governing Committee Projects (Extract Guidelines).
Proposals

Item #: 304
UPC 2024 Section: L 503.3.4

SUBMITTER: David D Dexter, P.E.
3D Engineering Consultants, LLC

RECOMMENDATION:
Revise text

L 503.0 Service Hot Water – Other Than Low-Rise Residential Buildings.

L 503.3 Mandatory Provisions. (remaining text unchanged)
L 503.3.4 Hot Water System Design. Hot water systems shall comply with Section L 503.3.4(1) and Section L 503.3.4(2).

(1) Recirculation systems shall comply with the provisions of Section L 501.3. Circulating hot water systems shall be arranged so that the circulating pump(s) are capable of being turned off (automatically or manually) where the hot water system is not in operation.

Exception: For hospitals, custodial care facilities, nursing homes, hotels, or motels, devices that automatically turn off the circulation pump(s) shall not be utilized.

(2) Where used to maintain storage tank water temperature, circulating pump(s) shall be equipped with controls limiting operation to a period from the start of the heating cycle to a maximum of 5 minutes after the end of the heating cycle.

The maximum volume of water contained in hot water distribution lines between the water heater and the fixture stop or connection to showers, kitchen faucets, and lavatories shall be determined in accordance with Section L 502.7.

SUBSTANTIATION:
• Given the concern for Legionella risk mitigation in facilities where there are higher potentials to immuno-compromised person or persons with pre-existing condition, the current health care design advice is to maintain circulation along with a temperature above the growth range for pathogen growth.
• ASHRAE 188 recommends continuous circulation of the water system as part of a good water management program.
• OSHA Technical Manual, Section III, Chapter 7, V. Controls, 3, c states: Domestic hot-water recirculation pumps should run continuously. They should be excluded from energy conservation measures.
• JCAHO (Joint Commission on Accreditation of Healthcare Organizations) mandate that covered organizations follow the OSHA requirements
• VA (Veterans Administration) provides similar mandates to minimize Legionella risks.
• CMS (Centers for Medicare & Medicaid Services) provides similar mandates to minimize Legionella risks. Therefore, it is in the best interest of public health, safety and welfare to provide this revision to the minimum requirements of the code as a way to comply with the requirements of other authorities and in the interest of mitigating the risk of Legionella as well as other potential pathogens within the water system

COMMITTEE ACTION: REJECT

COMMITTEE STATEMENT:
The proposal is being rejected as immuno-compromised persons or persons with pre-existing condition do not always occupy hotel and motel occupancies. The proposed language is not enforceable as there is no means of monitoring this after initial inspection. These requirements should be left to the local jurisdictions. Additionally, this change will eliminate the use of circulating pumps with timers that are currently in use.

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 22 NEGATIVE: 3 NOT RETURNED: 1 Daniels
EXPLANATION OF NEGATIVE:

BALLANCO: This change should have been accepted based on the substantiation.

GORSUCH: This proposal has good intentions and the substantiation justifies the change. I agree the language needs to be further refined. From a water quality control point of view, commercial buildings' hot water circulation shall maintain constant circulation (per OSHA requirement) unless the hot water system is completely shut down and drained. Water quality control should have priority over energy conservation.

MATA: The proponent has provided adequate justification as to why this proposal is needed. However, any needed revisions will be made at public comment.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: L 503.3.4  Item #: 304

SUBMITTER: David D. Dexter, PE
3D Engineering Consultants, LLC

RECOMMENDATION:
Revise text

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

L 503.3 Mandatory Provisions. (remaining text unchanged)

L 503.3.4 Hot Water System Design. Hot water systems shall comply with Section L 503.3.4(1) and Section L 503.3.4(2) the following:

(1) Recirculation systems shall comply with the provisions of Section L 501.3. Circulating hot water systems shall be arranged so that the circulating pump(s) are capable of being turned off (automatically or manually) where the hot water system is not in operation.

Exception: For healthcare facilities, long term care facilities, hotels, or motels, devices that automatically turn off the circulation pump(s) shall not be required.

(2) Where used to maintain storage tank water temperature, circulating pump(s) shall be equipped with controls limiting operation to a period from the start of the heating cycle to a maximum of 5 minutes after the end of the heating cycle.

(2) The maximum volume of water contained in hot water distribution lines between the water heater and the fixture stop or connection to showers, kitchen faucets, and lavatories shall be determined in accordance with Section L 502.7.

SUBSTANTIATION: Hotels after healthcare facilities has the highest incidence rate of Legionnaires' Disease and thus need to be included in this list. The IECC 2015, 2018, and 2021 requires aquastats and timers on ALL hot water recirculation pumps. Aquastats and timers can cause temperature stagnation of hot water systems which can lead to proliferation of waterborne pathogens and directly conflicts with NASEM Management of Legionella in Buildings, OSHA Technical Manual, ASHRAE 188, ASHRAE 12, among others. By indicating that the aquastats and timers “shall not be required” engineers, installers, and owners have the option to design, install, and operate hot water return systems in a manner that minimizes the risk of waterborne pathogen outbreaks, thus positively impacting public health and safety. Local jurisdictions that have adopted any version of IECC 2015 or later now have provisions that increase the risk of a health issue stemming from the hot water return system. Numerous engineers have unsuccessfully argued this point with local jurisdictions which is why this exception language is needed. By adding this exception language to the code, jurisdictions can better work with engineers, installers, and owners and become more aligned to the latest science in regards to hot water safety.
APPENDIX N
IMPACT OF WATER TEMPERATURE ON THE POTENTIAL FOR SCALDING AND LEGIONELLA GROWTH

N 101.0 General.
N 101.1 Applicability. This appendix provides guidelines on the impact of water temperature in minimizing both scalding and Legionella growth potential associated with occupiable commercial, institutional, multi-unit residential, and industrial building plumbing systems.

This Appendix shall not include single-family residential buildings. This appendix shall not be considered a risk management guidance document for scalding or Legionella.

Note: Published documents which address Legionella risk management include ASHRAE 188, ASHRAE Guideline 12, or as required by the Authority Having Jurisdiction.

There are additional factors associated with the potential for scalding and Legionella growth other than temperature.

For scalding potential, other factors include, but are not limited to, user age, health, body part, length of contact time, and water source.

For Legionella growth potential other factors include, but are not limited to, water source and plumbing system: size, design, circulation rate, water age, disinfectant residual, piping material and component complexity.

N 102.0 Definitions.
N 102.1 General. For the purpose of this appendix the following definitions shall apply:
Biofilm. Microorganisms and the slime they secrete that grow on any continually moist surface.
Control. The management to maintain compliance with established criteria.
Disinfection. Chemical or physical control measures or procedures used to kill or inactivate pathogens.
Disinfecting Hot Water. Water at a temperature not less than 160°F (71°C).
Hazard. See Risk.
Halogenation. A chemical reaction that involves the addition of one or more halogens, including, but not limited to, chlorine, bromine, or iodine, commonly used to disinfect water systems.
Hot Water. Water at a temperature not less than 130°F (54°C) and less than 140°F (60°C).
Legionella Growth Potential. The likelihood that Legionella bacteria will reproduce.
Monitor. Observing and checking the progress or quality of (something) or measuring the physical and chemical characteristics of control measures.
Risk. The potential to cause harm resulting from exposure.
Scald Potential. The likelihood of burning the skin.
Tempered Hot Water. Water at a temperature not less than 120°F (49°C) and less than 130°F (54°C).
Tepid Cold Water. Water at a temperature not less than 77°F (25°C) and less than 85°F (29°C).
Tepid Water. Water at a temperature not less than 85°F (29°C) and less than 110°F (43°C).
Test. The measurement of the physical, chemical, or microbial characteristics or quality of water.

N 102.7 Very Hot Water. Water at a temperature not less than 140°F (60°C) and less than 160°F (71°C).

N 102.4 Warm Water. Water at a temperature not less than 110°F (43°C) and less than 120°F (49°C).


N 103.0 Building Water System Design Documentation.
N 103.1 Required Design Documentation. Construction documents shall be required for new construction, renovation, refurbishment, replacement, or repurposing of an occupiable building water system, including a water management plan, and shall be submitted to the Authority Having Jurisdiction.

N 103.2 Onsite Documentation. Documentation shall be maintained onsite and shall be readily accessible to the Authority Having Jurisdiction.

N 104.0 Potential Exposure.

N 104.1 Legionella Growth Potential. The Authority Having Jurisdiction shall have the authority to require documentation to address Legionella growth potential, where water temperatures in a water distribution system are within ranges shown in Table N 104.1 Figure N 104.1 that pose a Legionella growth potential.

**FIGURE N 104.1**
WATER TEMPERATURE RANGES AND LEGIONELLA GROWTH POTENTIAL*

For SI units: °C = (°F-32)/1.8

* Temperature ranges reported are experimentally determined in a laboratory setting in the absence of a realistic microbial community. Legionella can survive for longer periods of time at temperatures higher and lower than the growth temperature ranges indicated due to changes in their metabolic state and/or protection from thermal disinfection within biofilm or amoeba host organisms.

N 104.2 Scald Potential. Where the water distribution system’s water temperature(s) range poses a scald potential in accordance with Table N 104.1 N 104.2, protection shall be provided in accordance with Chapter 4.
### TABLE N 104.1 | N 104.2
CORRELATION BETWEEN WATER TEMPERATURE RANGES, LEGIONELLA, AND SCALD POTENTIAL

<table>
<thead>
<tr>
<th>WATER DESCRIPTION</th>
<th>TEMPERATURE (°F)</th>
<th>SCALD POTENTIAL</th>
<th>LEGIONELLA GROWTH POTENTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold</td>
<td>&lt;77</td>
<td>None</td>
<td>Minimal</td>
</tr>
<tr>
<td>Tepid Cold</td>
<td>&gt;/=77 and &lt;85</td>
<td>None</td>
<td>Low</td>
</tr>
<tr>
<td>Tepid</td>
<td>&gt;/=85 and &lt;110</td>
<td>None</td>
<td>High</td>
</tr>
<tr>
<td>Warm</td>
<td>&gt;/=110 and &lt;120</td>
<td>Minimal</td>
<td>Moderate</td>
</tr>
<tr>
<td>Tempered Hot</td>
<td>&gt;/=120 and &lt;130</td>
<td>Low</td>
<td>None</td>
</tr>
<tr>
<td>Hot</td>
<td>&gt;/=130 and &lt;140</td>
<td>Moderate to High</td>
<td>None</td>
</tr>
<tr>
<td>Very Hot</td>
<td>&gt;/=140 and &lt;160</td>
<td>High</td>
<td>None</td>
</tr>
<tr>
<td>Disinfecting Hot</td>
<td>&gt;/=160</td>
<td>Immediate</td>
<td>None</td>
</tr>
</tbody>
</table>

**Notes:**

1: The infant, elderly, and infirmed have a higher potential for scalding at temperatures lower than listed.

2: Temperature ranges reported are experimentally determined in a laboratory setting in the absence of a realistic microbial community. Legionella can survive for longer periods of time at temperatures higher and lower than the growth temperature ranges indicated due to changes in their metabolic state and/or protection from thermal disinfection within biofilm or amoeba host organisms.

### N 105.0 Disinfection.

**N 105.1 Disinfection Documentation.** Where required by the Authority Having Jurisdiction, documentation for disinfection of all building water systems shall be provided by the registered design professional in the construction documents.

Methods for new construction and any repaired system disinfection shall include, but not be limited to, the chlorination methods and procedures for flushing and disinfection in accordance with Section 609.10.

Other or alternative water treatment methods for disinfection shall include, but not be limited to, one of the following methods:

**(+)** **N 105.1.1 Copper-Silver Ionization.** Copper-silver ionization methods and procedures, shall include including the following documentation.

(a1) Copper and silver ionization concentrations shall be included in the documentation.
(b2) Methods and documentation for monitoring ion levels.

(3) Electrode cleaning cycles and methods shall be reported.

(2) N 105.1.2 Ultraviolet Light. Ultraviolet light methods shall include the following documentation:

(a1) Locations of ultraviolet light units.

(b2) Cleaning cycles and methods of the quartz sleeves and housing shall be documented.

N 105.2 Chemical Disinfection. Chemical biocide treatment shall be permitted to be used in accordance with the following:

(1) Oxidizing biocides in accordance with manufacturer’s guidelines.

(2) Non-oxidizing biocides in accordance with manufacturer’s guidelines.

(3) Alternating the use of different types of biocides, dose, and frequency is recommended.

(4) These treatment methods can be used for continuous, online disinfection or shock treatment online or offline.

(5) Biocides intended for potable water applications shall listed in accordance with NSF 60 and approved by the Authority Having Jurisdiction.

N 105.3 Non-Chemical Treatment. Non-chemical treatment devices shall be permitted to be used in accordance with manufacturer’s guidelines.

N 105.3.1 Thermal Shock. Thermal treatment using heat shock at 158°F (70°C) for 30 minutes shall be permitted in accordance with applicable guidelines and the Authority Having Jurisdiction.

N 105.4 Frequency of Cleaning and Disinfection. Where a water management plan is implemented, the frequency of cleaning and disinfection logs shall be readily accessible to the water management team and the Authority Having Jurisdiction.

N 105.5 Control Measures. Control measures for Legionella prevention shall be evaluated for potential consequences that affect overall health risks.

N 201.0 Supply System Legionella Test Levels.

N 201.1 General. The minimum remediation action for water supply systems shall be in accordance with Table N 201.1.

**TABLE N 201.1**

<table>
<thead>
<tr>
<th>Percentage of Positive Legionella Test Sites</th>
<th>Remediation Action¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30</td>
<td>Maintain environmental assessment and Legionella monitoring in accordance with the water management plan.</td>
</tr>
</tbody>
</table>
| ≥ 30                                        | - Immediately institute short-term control measures² in accordance with the direction of a qualified professional³ and notify the Authority Having Jurisdiction, if required.  
- The water system shall be re-sampled no sooner than 7 days and no later than 4 weeks after disinfection to determine the efficacy of the treatment.  
- For persistent results, as determined by the Authority Having Jurisdiction, showing ≥ 30 percent positive sites, long-term control measures⁵ shall be implemented in accordance with the direction of a qualified professional³ and the Authority Having Jurisdiction.  
- Retreat and retest. If retest is ≥ 30 percent positive, repeat short-term control measures.²  
- With receipt of results < 30 percent positive⁴, resume monitoring in accordance with the water management plan.  
- For persistent results, as determined by the Authority Having Jurisdiction, showing ≥ 30 percent positive sites, long-term control measures⁵ shall be implemented in accordance with the direction of a qualified professional³ and the Authority Having Jurisdiction. |

**Notes:**

¹ In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.

² Short-term control measures are temporary interventions that may include, but are not limited to, heating and flushing the water system, hyperchlorination, or the temporary installation of treatment such as copper silver ionization (CSI).

³ Control measures shall be conducted in accordance with the direction of a qualified professional. A qualified professional is an Authority Having Jurisdiction licensed professional engineer, certified industrial hygienist, certified
A water technologist, environmental consultant or water treatment professional with training and experience performing assessments and sampling in accordance with current standard industry protocols.

Positive samples should be minimized.

Long-term control measures may include supplemental disinfection treatments.

N 202.0 Emergency Response Plan.
N 202.1 General. An emergency response plan shall be provided when required by with the Authority Having Jurisdiction and shall include, but not be limited to, the following:

1. Procedures to be followed if there are cases of Legionellosis associated with the plumbing system.
2. Procedures to be followed if the plumbing system reaches greater than or equal to 30 percent of test sites positive for Legionella.
3. Testing for Legionella shall be performed. Procedures shall include the type of tests to be performed, sampling, and the interpretation of test results.
4. Procedures for emergency disinfection.
5. Procedures for other actions identified by the water management plan to prevent exposure to contaminated water.

### TABLE 1701.2

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF/ANSI/CAN 60-2020</td>
<td>Drinking Water Treatment Chemicals - Health Effects</td>
<td>Water Treatment</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The UMC Legionella Task Group met several times throughout 2020 to develop a new Appendix (Impact of Water Temperature on the Potential for Legionella Growth) to establish minimum requirements for building mechanical systems to minimize Legionella growth potential within such systems. The UMC Legionella Task Group also reviewed the existing UPC Appendix N (Impact of Water Temperature on the Potential for Scalding and Legionella Growth) to correlate and further enhance the UPC Appendix N. Included in the recommendations are a new Figure N 104.1 that is a specifically scaled for Legionella growth potential. Figure N 104.2 (formerly Figure N 104.1) remains mostly unchanged, except that the Legionella growth potential temperature ranges have been relocated into a separate figure, Figure N 104.1. This update simplifies the temperature ranges for Legionella growth potential and scald potential and adds clarity for the end user on the use of the figures and assists when acquiring the important information needed. The updates also include a distinction between chemical and non-chemical disinfection and treatment criteria, remediation guidelines for domestic water, and an emergency response plan.

**COMMITTEE ACTION:** ACCEPT AS SUBMITTED

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 25   NOT RETURNED: 1   Daniels

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**Appended Comments**

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**PUBLIC COMMENT 1**

**Code Year:** 2024 UPC  **Section #:** Appendix N  **Item #:** 305  **Comment #:** 1

**SUBMITTER:** Kristy Egg (Egg Geo), James Kemper (LADWP), Dr. Stout (Special Pathogens Laboratory)

**RECOMMENDATION:**
Revise text

Request to accept the code change proposal as modified by this public comment.
APPENDIX N
IMPACT OF WATER TEMPERATURE ON THE POTENTIAL FOR SCALDING AND LEGIONELLA GROWTH

N 101.0 General.
N 101.1 Applicability. This appendix provides guidelines on the impact of water temperature in minimizing both scalding and Legionella growth potential associated with occupiable commercial, institutional, multi-unit residential, and industrial building plumbing systems.
This Appendix shall not include single-family residential buildings. This appendix shall not be considered a risk management guidance document for scalding or Legionella. Where required by the Authority Having Jurisdiction, Legionella risk management shall be in accordance with ASHRAE 188 and ASHRAE Guideline 12.
Note: Published documents which address Legionella risk management include ASHRAE 188, ASHRAE Guideline 12, or as required by the Authority Having Jurisdiction.
There are additional factors associated with the potential for scalding and Legionella growth other than temperature. For scalding potential, other factors include, but are not limited to, user age, health, body part, length of contact time, and water source.
For Legionella growth potential other factors include, but are not limited to, water source and plumbing system: size, design, circulation rate, water age, disinfectant residual, piping material and component complexity.

N 102.0 Definitions.
N 102.1 General. For the purpose of this appendix, the following definitions shall apply:
Biofilm. Microorganisms and the slime they secrete that grow on any continually moist surface.
Cold Water. Water at a temperature less than 77°F (25°C).
Control. The management of the operating conditions to maintain compliance with established criteria. (ASHRAE 188:3)
Disinfection. Chemical or physical control measures or procedures used to kill or inactivate pathogens. The process of killing or inactivating microorganisms. [ASHRAE 188:3]
Disinfecting Hot Water. Water at a temperature not less than 160°F (71°C).
Hazard. See Risk.
Halogenation. A chemical reaction that involves the addition of one or more halogens, including, but not limited to, chlorine, bromine, or iodine, commonly used to disinfect water systems.
Hot Water. Water at a temperature not less than 130°F (54°C) and less than 140°F (60°C).
Legionella Growth Potential. The likelihood that Legionella bacteria will reproduce.
Monitor. Observing and checking the progress or quality of (something) or measuring the physical and chemical characteristics of control measures.
Risk. The potential to cause harm for harm to humans resulting from exposure to Legionella. [ASHRAE 188:3]
Scald Potential. The likelihood of burning the skin.
Tempered Hot Water. Water at a temperature not less than 120°F (49°C) and less than 130°F (54°C).
Tepid Cold Water. Water at a temperature not less than 77°F (25°C) and less than 85°F (29°C).
Tepid Water. Water at a temperature not less than 85°F (29°C) and less than 110°F (43°C).
Test. The measurement of the physical, chemical, or microbial characteristics or quality of water.
Very Hot Water. Water at a temperature not less than 140°F (60°C) and less than 160°F (71°C).
Warm Water. Water at a temperature not less than 110°F (43°C) and less than 120°F (49°C).

N 103.0 Building Water System Design Documentation.
N 103.1 Design Documentation. Construction documents shall be required for new construction, renovation, refurbishment, replacement, or repurposing of an occupiable building water system, including a water management plan, and shall be submitted to the Authority Having Jurisdiction.
N 103.2 Onsite Documentation. Documentation shall be maintained onsite and shall be readily accessible to the Authority Having Jurisdiction.

N 104.0 Potential Exposure.
N 104.1 Legionella Growth Potential. The Authority Having Jurisdiction shall have the authority to require documentation to address Legionella growth potential, where water temperatures in a water distribution system are within ranges shown in Figure N 104.1 that pose a Legionella growth potential.
N 104.2 Scald Potential. Where the water distribution system’s water temperature(s) range poses a scald potential in accordance with Table N 104.2, protection shall be provided in accordance with Chapter 4.
N 105.0 Disinfection.

N 105.1 Disinfection Documentation. Where required by the Authority Having Jurisdiction, documentation for disinfection of all building water systems shall be provided by the registered design professional in the construction documents.

N 105.1.1 Copper-Silver Ionization. Copper-silver ionization methods and procedures, shall include the following documentation:

1. Copper and silver ionization concentrations.
2. Methods and documentation for monitoring ion levels.
3. Electrode cleaning cycles and methods.

N 105.1.2 Ultraviolet Light. Ultraviolet light methods shall include the following documentation:

1. Locations of ultraviolet light units.
2. Cleaning cycles and methods of the quartz sleeves and housing.

N 105.2 Chemical Disinfection. Chemical biocide treatment shall be permitted to be used in accordance with the following:

1. Oxidizing biocides in accordance with manufacturer’s guidelines, or as required by the Authority Having Jurisdiction.
2. Non-oxidizing biocides in accordance with manufacturer’s guidelines.
3. Alternating the use of different types of biocides, dose, and frequency is recommended.
4. These treatment methods can be used for continuous, online disinfection or shock treatment online or offline.
5. Biocides intended for potable water applications shall listed in accordance with NSF/ANSI/CAN 60 and approved by the Authority Having Jurisdiction.

N 105.3 Non-Chemical Treatment. Non-chemical treatment devices shall be permitted to be used in accordance with manufacturer’s guidelines.

N 105.3.1 Thermal Shock. Thermal treatment using heat shock at 158°F (70°C) for 30 minutes shall be permitted in accordance with applicable guidelines and the Authority Having Jurisdiction.

N 105.4 Frequency of Cleaning and Disinfection. Where a water management plan is implemented, the frequency of cleaning and disinfection logs shall be readily accessible to the water management team and the Authority Having Jurisdiction.

N 105.5 Control Measures. Control measures for Legionella prevention shall be evaluated for potential consequences that affect overall health risks.

N 201.0 Supply System Legionella Test Levels.

N 201.1 General. The minimum remediation action for water supply systems shall be in accordance with Table N 201.1.

N 202.0 Emergency Disinfection Procedure Response Plan.

N 202.1 General. An emergency response plan disinfection procedure shall be provided in accordance with Table N 201.1, when required by with the Authority Having Jurisdiction and shall include, but not be limited to, the following:

1. Procedures to be followed if there are cases of Legionellosis associated with the plumbing system.
2. Procedures to be followed if the plumbing system reaches greater than or equal to 30 percent of test sites positive for Legionella.
3. Testing for Legionella shall be performed. Procedures shall include the type of tests to be performed, sampling, and the interpretation of test results.
4. Procedures for emergency disinfection.
5. Procedures for other actions identified by the water management plan to prevent exposure to contaminated water.
### TABLE N 104.2
WATER TEMPERATURE RANGES AND SCALD POTENTIAL

<table>
<thead>
<tr>
<th>WATER DESCRIPTION</th>
<th>TEMPERATURE (°F)</th>
<th>SCALD POTENTIAL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold</td>
<td>&lt;77</td>
<td>None</td>
</tr>
<tr>
<td>Tepid Cold</td>
<td>≥77 and &lt;85</td>
<td>None</td>
</tr>
<tr>
<td>Tepid</td>
<td>≥85 and &lt;110</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hyperthermia is possible after long exposure in a bathtub or whirlpool tub.</td>
</tr>
<tr>
<td>Warm</td>
<td>≥110 and &lt;120</td>
<td>Minimal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>At 111°F, greater than 220 minutes for second-degree burn.</td>
</tr>
<tr>
<td>Tempered Hot</td>
<td>≥120 and &lt;130</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>At 120°F, greater than 5 minutes for second-degree burn, and 10 minutes to third-degree burn; At 124°F, two minutes for second-degree burn, and 4 minutes, 10 seconds for third-degree burn.</td>
</tr>
<tr>
<td>Hot</td>
<td>≥130 and &lt;140</td>
<td>Moderate to High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>At 130°F, 18 seconds for second-degree burn, and 30 seconds for third-degree burn.</td>
</tr>
<tr>
<td>Very Hot</td>
<td>≥140 and &lt;160</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td></td>
<td>At 140°F, three seconds for second-degree burn, and 5 seconds for third-degree burn; At 150°F, instant for second-degree burn, and less than two seconds for third-degree burn; At 158°F, instant for second-degree burn, and less than a second for third-degree burn.</td>
</tr>
<tr>
<td>Disinfecting Hot</td>
<td>≥160</td>
<td>Immediate</td>
</tr>
</tbody>
</table>

For SI units: °C = (°F-32)/1.8

* The infant, elderly, and infirmed have a higher potential for scalding at temperatures lower than listed.

### TABLE N 201.1
LEGIONELLA REMEDIATION ACTIONS DOMESTIC WATER SYSTEMS

<table>
<thead>
<tr>
<th>PERCENTAGE OF POSITIVE LEGIONELLA TEST SITES</th>
<th>REMEDIATION ACTION¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30</td>
<td>• Maintain environmental assessment and Legionella monitoring in accordance with the water management plan.</td>
</tr>
</tbody>
</table>
| = 30                                        | • Immediately institute short-term control measures² in accordance with the direction of a qualified professional³ and notify the Authority Having Jurisdiction, if required.  
• The water system shall be re-sampled no sooner than 7 days and no later than 4 weeks after disinfection to determine the efficacy of the treatment.  
• For persistent results, as determined by the Authority Having Jurisdiction, showing = 30 percent positive sites, long-term control measures⁶ shall be implemented in accordance with the direction of a qualified professional³ and the Authority Having Jurisdiction.  
• Retreat and retest. If retest is = 30 percent positive, repeat short-term control measures.²  
• With receipt of results < 30 percent positive⁴, resume monitoring in accordance with the water management plan.  
• For persistent results, as determined by the Authority Having Jurisdiction, showing = 30 percent positive sites, long-term control measures⁶ shall be implemented in accordance with the direction of a qualified professional³ and the Authority Having Jurisdiction. |

Notes:

¹ In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.

² In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.

³ In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.

⁴ In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.

⁵ In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.

⁶ In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.

⁷ In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.

⁸ In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.

⁹ In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.
Short-term control measures are temporary interventions that may include, but are not limited to, heating and flushing the water system, hyperchlorination, or the temporary installation of treatment such as copper silver ionization (CSI).

Control measures shall be included in the water management plan, conducted in accordance with the direction of a qualified professional. A qualified professional is an Authority Having Jurisdiction licensed professional engineer; certified industrial hygienist; certified water technologist; environmental consultant or water treatment professional with training and experience performing assessments and sampling in accordance with current standard industry protocols.

Positive samples should be minimized.

Long-term control measures may include supplemental disinfection treatments.

SUBSTANTIATION:
Appendix N has been reviewed for accuracy and to assure that the provisions are enforceable. This appendix is not intended to supersede ASHRAE 188 and Guideline 12. We ask the UPC Committee to consider the following modifications:

- Definitions: The definitions were reviewed for accuracy and to cite ASHRAE 188 where necessary. The definition for “control,” “risk,” “disinfection,” and “risk,” were modified to be consistent with already accepted documents. The term “water management program” was revised for enforceability.
- Sections N 105.2 and N 105.3.1 were revised by removing unenforceable language. The unenforceable language from Section N 105.5 was removed. The AHJ will not be enforcing the control measures activity taken.
- Sections N 202.0 and N 202.1 were revised to remove language that is unenforceable and because such requirements are already part of Table N 201.1.
- Table N201.1 was revised to remove unenforceable notes. The values were verified and obtained from: https://regs.health.ny.gov/volume-title-10/11428922/appendix-4-b-interpretation-routine-legionella-culture-results-covered

The remaining sections have been reviewed for accuracy and for enforcement. The UPC TC asked for enforceable language to be created. However, the language needed some improvements, and this comment makes the improvements needed. The Committee has previously requested for such an appendix because of issues with enforcing ASHRAE 188 and Guideline 12 as written. These modifications will be well received by Jurisdictions looking for the correlation between water temperature, percentage, and Legionella risk. Jurisdictions can obtain such provisions with the revised appendix, along with using ASHRAE 188 and Guideline 12 if they chose to do so. This appendix can be utilized with those other recognized documents.

PUBLIC COMMENT 2
Code Year: 2024 UPC  Section #: Appendix N, Table 1701.2  Item #: 305
SUBMITTER: Emily Toto (ASHRAE); Paul A Lindahl Jr (SPX CT, Rep. Cooling Technology Institute)
RECOMMENDATION: Revise text
Request to accept the code change proposal as modified by this public comment.

APPENDIX N

PART 1 - IMPACT OF WATER TEMPERATURE ON THE POTENTIAL FOR SCALDING AND

PART 2 – MINIMUM REQUIREMENTS TO ADDRESS LEGIONELLA GROWTH IN PLUMBING SYSTEMS
N 101.0 General.
N 101.1 Applicability. This appendix provides guidelines on the impact of water temperature in minimizing both scalding and Legionella growth potential associated with Legionella growth potential. Both Part 1 and Part 2 of this appendix shall apply to occupiable commercial, institutional, multi-unit residential, and industrial building plumbing systems. This Appendix shall not include single-family residential buildings. This appendix shall not be considered a risk management guidance document for scalding or Legionella.

Note: Maintaining lower water temperature can reduce the potential for scalding, but lower water temperature can also increase the potential for Legionella growth. Maintaining higher water temperature is one way to reduce the potential for Legionella growth, but higher water temperature can also increase the risk of scalding. There are additional factors associated with the potential for scalding and Legionella growth other than temperature.

Published documents which address Legionella risk management include ASHRAE 188, ASHRAE Guideline 12, or as required by the Authority Having Jurisdiction.

There are additional factors associated with the potential for scalding and Legionella growth other than temperature.

For scalding potential, other factors include, but are not limited to, user age, health, body part, length of contact time, and water source.

For Legionella growth potential, other factors include, but are not limited to, water source and plumbing system size, design, circulation rate, water age, disinfectant residual, piping material and component complexity.

N 102.0 Definitions.
N 102.1 General. For the purpose of this appendix the following definitions shall apply:

**Biofilm.** Microorganisms and the slime they secrete that grow on any continually moist surface.

**Cold Water.** Water at a temperature less than 77°F (25°C).

**Control.** The management to maintain compliance with established criteria.

**Disinfection.** Chemical or physical control measures or procedures used to kill or inactivate pathogens.

**Disinfecting Hot Water.** Water at a temperature not less than 160°F (71°C).

**Hazard.** See Risk.

**Halogenation.** A chemical reaction that involves the addition of one or more halogens, including, but not limited to, chlorine, bromine, or iodine, commonly used to disinfect water systems.

**Hot Water.** Water at a temperature not less than 130°F (54°C) and less than 140°F (60°C).

**Legionella Growth Potential.** The likelihood that Legionella bacteria will reproduce.

**Monitor.** Observing and checking the progress or quality of (something) or measuring the physical and chemical characteristics of control measures:

**Risk.** The potential to cause harm resulting from exposure.

**Scald Potential.** The likelihood of burning the skin.

**Tempered Hot Water.** Water at a temperature not less than 120°F (49°C) and less than 130°F (54°C).

**Tepid Cold Water.** Water at a temperature not less than 77°F (25°C) and less than 85°F (29°C).

**Tepid Water.** Water at a temperature not less than 85°F (29°C) and less than 110°F (43°C).

**Test.** The measurement of the physical, chemical, or microbial characteristics or quality of water.

**Very Hot Water.** Water at a temperature not less than 140°F (60°C) and less than 160°F (71°C).

**Warm Water.** Water at a temperature not less than 110°F (43°C) and less than 120°F (49°C).

**Water Management Plan.** A comprehensive risk management plan for controlling Legionella growth in building water systems.

N 103.0 Building Water System Design Documentation.

N 103.1 Design Documentation. Construction documents shall be required for new construction, renovation, refurbishment, replacement, or repurposing of an occupiable building water system, including a water management plan; and shall be submitted to the Authority Having Jurisdiction.

N 103.2 Onsite Documentation. Documentation shall be maintained onsite and shall be readily accessible to the Authority Having Jurisdiction.

N 104.0 Part 1 – Impact of Water Temperature on the Potential for Scalding Potential Exposure.

N 104.1 Legionella Growth Potential. The Authority Having Jurisdiction shall have the authority to require documentation to address Legionella growth potential, where water temperatures in a water distribution system are within ranges shown in Figure N 104.1 that pose a Legionella growth potential.
FIGURE N.104.1
WATER TEMPERATURE RANGES AND LEGIONELLA GROWTH POTENTIAL*

For SI units: °C = (°F - 32) / 1.8
*Temperature ranges reported are experimentally determined in a laboratory setting in the absence of a realistic microbial community. Legionella can survive for longer periods of time at temperatures higher and lower than the growth temperature ranges indicated due to changes in their metabolic state and/or protection from thermal disinfection within biofilm or amoeba host organisms.

N.104.2-N.104.1 Scald Potential. Where the water distribution system's water temperature(s) range poses a scald potential in accordance with Table N.104.2-N.104.1, protection shall be provided in accordance with Chapter 4.

<table>
<thead>
<tr>
<th>WATER DESCRIPTION</th>
<th>TEMPERATURE (°F)</th>
<th>SCALD POTENTIAL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold</td>
<td>&lt;77</td>
<td>None</td>
</tr>
<tr>
<td>Tepid Cold</td>
<td>&gt;/=77 and &lt;85</td>
<td>None</td>
</tr>
<tr>
<td>Tepid</td>
<td>&gt;/=85 and &lt;110</td>
<td>Hyperthermia is possible after long exposure in a bathtub or whirlpool tub.</td>
</tr>
<tr>
<td>Warm</td>
<td>&gt;/=110 and &lt;120</td>
<td>Minimal</td>
</tr>
<tr>
<td>Tempered Hot</td>
<td>&gt;/=120 and &lt;130</td>
<td>Low</td>
</tr>
<tr>
<td>Hot</td>
<td>&gt;/=130 and &lt;140</td>
<td>Moderate to High</td>
</tr>
<tr>
<td>Very Hot</td>
<td>&gt;/=140 and &lt;160</td>
<td>High</td>
</tr>
<tr>
<td>Disinfecting Hot</td>
<td>&gt;/=160</td>
<td>Immediate</td>
</tr>
</tbody>
</table>

For SI units: °C = (°F - 32) / 1.8
*The infant, elderly, and infirmed have a higher potential for scalding at temperatures lower than listed.
### N 105.0 Part 2 – MINIMUM REQUIREMENTS TO ADDRESS LEGIONELLA GROWTH IN PLUMBING SYSTEMS

**Disinfection.**

**N 105.1 General.** Plumbing systems shall comply with the requirements of ASHRAE Standard 188, Legionellosis: Risk Management for Building Water Systems with practice informed by Guideline 12, Managing the Risk of Legionellosis Associated with Building Water Systems and shall be in accordance with the applicable rules and regulations, this code, and the mechanical code.

**Disinfection Documentation.** Where required by the Authority Having Jurisdiction, documentation for disinfection of all building water systems shall be provided by the registered design professional in the construction documents.

**N 105.1.1 Copper-Silver Ionization.** Copper-silver ionization methods and procedures, shall include the following documentation:

1. Copper and silver ionization concentrations.
2. Methods and documentation for monitoring ion levels.
3. Electrode cleaning cycles and methods.

**N 105.1.2 Ultraviolet Light.** Ultraviolet light methods shall include the following documentation:

1. Locations of ultraviolet light units.
2. Cleaning cycles and methods of the quartz sleeves and housing.

**N 105.2 Chemical Disinfection.** Chemical biocide treatment shall be permitted to be used in accordance with the following:

1. Oxidizing biocides in accordance with manufacturer’s guidelines.
2. Non-oxidizing biocides in accordance with manufacturer’s guidelines.
3. Alternating the use of different types of biocides, dose, and frequency is recommended.
4. These treatment methods can be used for continuous, online disinfection or shock treatment online or offline.
5. Biocides intended for potable water applications shall be listed in accordance with NSF 60 and approved by the Authority Having Jurisdiction.

**N 105.3 Non-Chemical Treatment.** Non-chemical treatment devices shall be permitted to be used in accordance with manufacturer’s guidelines.

**N 105.3.1 Thermal Shock.** Thermal treatment using heat shock at 158°F (70°C) for 30 minutes shall be permitted in accordance with applicable guidelines and the Authority Having Jurisdiction.

**N 105.4 Frequency of Cleaning and Disinfection.** Where a water management plan is implemented, the frequency of cleaning and disinfection logs shall be readily accessible to the water management team and the Authority Having Jurisdiction.

**N 105.5 Control Measures.** Control measures for Legionella prevention shall be evaluated for potential consequences that affect overall health risks.

### N 201.0 Supply System Legionella Test Levels.

**N 201.1 General.** The minimum remediation action for water supply systems shall be in accordance with Table N 201.1.

#### TABLE N 201.1

<table>
<thead>
<tr>
<th>Percentage of Positive Legionella Test Sites</th>
<th>Remediation Action&lt;sup&gt;4&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30</td>
<td>Maintain environmental assessment and Legionella monitoring in accordance with the water management plan.</td>
</tr>
</tbody>
</table>
| >=30                                      | • Immediately institute short-term control measures<sup>2</sup> in accordance with the direction of a qualified professional<sup>3</sup> and notify the Authority Having Jurisdiction, if required.  
• The water system shall be re-sampled no sooner than 7 days and no later than 4 weeks after disinfection to determine the efficacy of the treatment.  
• For persistent results, as determined by the Authority Having Jurisdiction, showing >=30 percent positive sites, long-term control measures<sup>6</sup> shall be implemented in accordance with the direction of a qualified professional<sup>3</sup> and the Authority Having Jurisdiction.  
• Retreat and retest. If retest is = 30 percent positive, repeat short-term control measures.<sup>2</sup>  
• With receipt of results < 30 percent positive<sup>4</sup>, resume monitoring in accordance with the water management plan.  
• For persistent results, as determined by the Authority Having Jurisdiction, showing <=30 percent positive sites, long-term control measures<sup>8</sup> shall be implemented in accordance with the direction of a qualified professional<sup>3</sup> and the Authority Having Jurisdiction. |

**Notes:**

1 In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.
2 Short-term control measures are temporary interventions that may include, but are not limited to, heating and flushing the water system, hyperchlorination, or the temporary installation of treatment such as copper silver ionization (CSI).

3 Control measures shall be conducted in accordance with the direction of a qualified professional. A qualified professional is an Authority Having Jurisdiction licensed professional engineer; certified industrial hygienist; certified water technologist; environmental consultant or water treatment professional with training and experience performing assessments and sampling in accordance with current standard industry protocols.

4 Positive samples should be minimized.

5 Long-term control measures may include supplemental disinfection treatments.

N 202.0 Emergency Response Plan.

N 202.1 General. An emergency response plan shall be provided when required by with the Authority Having Jurisdiction and shall include, but not be limited to, the following:

1. Procedures to be followed if there are cases of Legionellosis associated with the plumbing system.
2. Procedures to be followed if the plumbing system reaches greater than or equal to 30 percent of test sites positive for Legionella.
3. Testing for Legionella shall be performed. Procedures shall include the type of tests to be performed, sampling, and the interpretation of test results.
4. Procedures for emergency disinfection.
5. Procedures for other actions identified by the water management plan to prevent exposure to contaminated water.

### TABLE 1701.2

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF/ANSI/CAN 60-2020</td>
<td>Drinking Water Treatment Chemicals—Health Effects</td>
<td>Water Treatment</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**

Emily Toto:

The proposed revisions separate the scalding and Legionella text, maintaining the current impact of water temperature on the potential for scaling as PART 1 and placing new minimum requirements to address Legionella growth in plumbing systems as PART 2. ASHRAE does not oppose placing the PART 1 and PART 2 text into two separate appendices if the technical committee feels usability would be improved.

As originally proposed, Appendix N does not align with ANSI/ASHRAE 188, Legionellosis: Risk Management for Building Water Systems and its supporting document, ASHRAE Guideline 12, Managing the Risk of Legionellosis Associated with Building Water Systems. ANSI/ASHRAE 188 and the latest version of ASHRAE Guideline 12, are the result of almost three decades of development. As background, there were multiple public reviews beginning in the early 1990s and numerous independent substantive reviews to gain input and consensus. ANSI/ASHRAE 188 and ASHRAE Guideline 12 contain extensive input from industry, academia, and healthcare and from city, state, and national public health departments and regulatory authorities. ANSI/ASHRAE 188 has been subject to continuous maintenance since it was first published in 2015 and ASHRAE Guideline 12 has been subject to continuous maintenance since the 2018 edition was published. Both are published on a three-year cycle to incorporate all accepted changes. To facilitate adoption, the current version of ANSI/ASHRAE 188 is written in code enforceable language with each requirement worded to enable yes/no compliance confirmation. ANSI/ASHRAE 188 is structured to allow UMC Appendix H to address Legionella growth only in mechanical equipment/systems, separate from Legionellosis growth in potable plumbing systems addressed by the plumbing code.

The duplication and differences between the existing ANSI/ASHRAE 188 and the associated ASHRAE Guideline 12 and the proposed Appendix N will lead to user confusion and is a violation of the ANSI Essential Requirements Document, specifically Section 2.4.

Appendix N:

1. does not include all of the plumbing system requirements and guidance contained in ANSI/ASHRAE 188 and ASHRAE Guideline 12, which may lead users to a false sense of security and to believe that Legionella growth and the risk of Legionellosis from their plumbing systems have been adequately addressed.
2. does not include adequate and proper guidance for the operators or AHJ
3. contains requirements that are overly prescriptive
4. contains guidance and requirements that are incorrect or incomplete
5. contains requirements and guidance that conflict with ANSI/ASHRAE 188 or ASHRAE Guideline 12.
contains requirements and guidance that unnecessarily burdens all buildings to take the same actions, even though buildings with complex plumbing systems and buildings associated with immunocompromised and higher risk individuals present a higher risk of legionellosis than buildings with simple plumbing systems and buildings that are not associated with higher risk individuals. (ANSI/ASHRAE 188 requirements address these differences)

Note that the ASHRAE Standing Standard Project Committee (SSPC) 188 voted 22-0-1 to reject the inclusion of Appendix N into the UPC as originally proposed. ASHRAE SSPC 188 appreciates the time spent by the IAPMO Technical Committee and Legionella Task Group to develop the proposed language. ASHRAE SSPC 188 invites the Technical Committee to engage in a collaborative revision of the proposed code language that could be incorporated into a future code revision. Such collaboration would ensure consistency among standards, would lessen confusion for users, and would increase the probability of a positive public health and safety outcome. SSPC 188 looks forward to working with IAPMO on this important project.

Paul A Lindahl Jr:
The proposed revisions separate the scalding and Legionella text, maintaining the current impact of water temperature on the potential for scalding as PART 1 and placing new minimum requirements to address Legionella growth in plumbing systems as PART 2. The CTI does not oppose placing the modified PART 1 and PART 2 text into two separate appendices if the technical committee feels usability would be improved.

Reducing the risk of Legionella in Building Water Systems is of paramount importance to the Cooling Technology Institute (CTI). As an organization, we support ASHRAE Standard 188 and Guideline 12. We also view scalding as an important issue to be addressed in Building Water Systems but one that does not fall into our organization’s primary area of expertise. As such, our comments are focused primarily on Legionella and not scalding.

The text in proposed Appendix N does not align with ANSI/ASHRAE Standard 188, Legionellosis: Risk Management for Building Water Systems and the supporting document, ANSI/ASHRAE Guideline 12, Managing the Risk of Legionellosis Associated with Building Water Systems. These documents were developed over many years through consensus processes by teams of subject matter experts, including many who are also members of the CTI, and then regularly reviewed, updated, and republished as required. In addition, the current version of Standard 188 has been written in code enforceable language with each requirement worded to enable yes/no compliance confirmation. Note also that Standard 188 is structured to allow UPC Appendix N to address legionella growth in general plumbing systems, separate from legionella growth in mechanical equipment and their associated systems, which are addressed in the mechanical code. The duplication and differences between the existing Standard 188 and the associated Guideline 12 language and the proposed Appendix N text will lead to user confusion and is a violation of the ANSI Essential Requirements Document, specifically Section 2.4.

Appendix N repeats copyrighted Standard 188 and Guideline 12 content without notation as well as causes confusion by “paraphrasing” Standard 188 and Guideline 12 language. Appendix N does not include all the plumbing system requirements and guidance that are covered by Standard 188 and Guideline 12. This may lead users to a false sense of security and to believe that Legionella growth and the risk of Legionellosis from plumbing systems have been completely addressed. We also feel that Appendix N is overly prescriptive, taking a “one size fits all” approach to the control of Legionella, including not accounting for regional climatic and regulatory differences in the design of building water systems while at the same time not providing adequate and correct guidance for system operators and local code officials. In addition, many of the requirements in Appendix N also conflict with Standard 188 and Guideline 12. Appendix N also does not address the impact of the quality of the incoming water to the building from the utility which can be a critical factor in reducing the risk from Legionella. Finally, Appendix N as originally drafted contains requirements and guidance that unnecessarily burdens all buildings to take the same actions, even though buildings with complex plumbing systems and buildings associated with immunocompromised and higher risk individuals present a higher risk of legionellosis than buildings with simple plumbing systems and buildings that are not associated with higher risk individuals (note that Standard 188 addresses these differences with a required annual building survey of risk factors).

This comment is submitted on behalf of the CTI Regulatory Committee which has been empowered by the CTI President and the CTI Board of Directors to respond to such proposals. Note that the Regulatory Committee voted unanimously to support this comment as submitted. The CTI represents many Owners and Operators, Suppliers, and Manufacturers of environmentally sustainable heat rejection solutions, none of whom to our knowledge were consulted in the development of this proposal.
PUBLIC COMMENT 3

Code Year: 2024 UPC  Section #: Appendix N, Table 1701.2
SUBMITTER: Daryn Cline
EVAPCO, Inc.

RECOMMENDATION:
Revise text

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

SUBSTANTIATION:
Recommend deleting all suggested revisions to Appendix N, and maintain Appendix N as introduced in 2021. Additional language is not easily substantiated (disinfecting methods), does not include all water using systems, and is in conflict with existing recognized building standards developed by ASHRAE.

PUBLIC COMMENT 4

Code Year: 2024 UPC  Section #: Appendix N, Table 1701.2
SUBMITTER: Greg Lowman
Baltimore Aircoil Company

RECOMMENDATION:
Delete text without substitution

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

APPENDIX N

IMPACT OF WATER TEMPERATURE ON THE POTENTIAL FOR SCALDING AND LEGIONELLA GROWTH

N 101.0 General:

N 101.1 Applicability. This appendix provides guidelines on the impact of water temperature in minimizing both scalding and Legionella growth potential associated with occupiable commercial, institutional, multi-unit residential, and industrial building plumbing systems. This Appendix shall not include single family residential buildings.

This appendix shall not be considered a risk management guidance document for scalding or Legionella.

Note: Published documents which address Legionella risk management include ASHRAE 188, ASHRAE Guideline 12, or as required by the Authority Having Jurisdiction.

There are additional factors associated with the potential for scalding and Legionella growth other than temperature.

For scalding potential, other factors include, but are not limited to: user age, health, body part, length of contact time, and water source.

For Legionella growth potential, other factors include, but are not limited to: water source and plumbing system size; design, circulation rate, water age, disinfectant residual, piping material, and component complexity.

N 102.0 Definitions:

N 102.1 General. For the purpose of this appendix the following definitions shall apply:

Biofilm. Microorganisms and the slime they secrete that grow on any continually moist surface.

Cold Water. Water at a temperature less than 77°F (25°C).

Control. The management to maintain compliance with established criteria.

Disinfection. Chemical or physical control measures or procedures used to kill or inactivate pathogens.

Disinfecting Hot Water. Water at a temperature not less than 160°F (71°C).

Hazard. See Risk.

Halogeneration. A chemical reaction that involves the addition of one or more halogens, including, but not limited to: chlorine, bromine, or iodine, commonly used to disinfect water systems.

Hot Water. Water at a temperature not less than 130°F (54°C) and less than 140°F (60°C).

Legionella Growth Potential. The likelihood that Legionella bacteria will reproduce.

Monitor. Observing and checking the progress or quality of (something) or measuring the physical and chemical characteristics of control measures.

Risk. The potential to cause harm resulting from exposure.

Scald Potential. The likelihood of burning the skin.
**Tempered Hot Water.** Water at a temperature not less than 120°F (49°C) and less than 130°F (54°C).

**Tepid Cold Water.** Water at a temperature not less than 77°F (25°C) and less than 85°F (29°C).

**Tepid Water.** Water at a temperature not less than 85°F (29°C) and less than 110°F (43°C).

**Test.** The measurement of the physical, chemical, or microbial characteristics or quality of water.

**Very Hot Water.** Water at a temperature not less than 140°F (60°C) and less than 160°F (71°C).

**Warm Water.** Water at a temperature not less than 110°F (43°C) and less than 120°F (49°C).

**Water Management Plan.** A comprehensive risk management plan for controlling Legionella growth in building water systems.

**N 103.0 Building Water System Design Documentation.**

**N 103.1 Design Documentation.** Construction documents shall be required for new construction, renovation, refurbishment, replacement, or repurposing of an occupiable building water system, including a water management plan, and shall be submitted to the Authority Having Jurisdiction.

**N 103.2 Onsite Documentation.** Documentation shall be maintained onsite and shall be readily accessible to the Authority Having Jurisdiction.

**N 104.0 Potential Exposure.**

**N 104.1 Legionella Growth Potential.** The Authority Having Jurisdiction shall have the authority to require documentation to address Legionella growth potential, where water temperatures in a water distribution system are within ranges shown in Figure N 104.1 that pose a Legionella growth potential.

**FIGURE N 104.1**

**WATER TEMPERATURE RANGES AND LEGIONELLA GROWTH POTENTIAL**

<table>
<thead>
<tr>
<th>WATER TEMPERATURE RANGE</th>
<th>LEGIONELLA GROWTH POTENTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold</td>
<td>None</td>
</tr>
<tr>
<td>Tepid Cold</td>
<td>None</td>
</tr>
<tr>
<td>Tepid</td>
<td>None</td>
</tr>
<tr>
<td>Warm</td>
<td>Minimal</td>
</tr>
<tr>
<td>Tempered Hot</td>
<td>Low</td>
</tr>
</tbody>
</table>

For SI units: °C = (°F − 32)/1.8

*Temperature ranges reported are experimentally determined in a laboratory setting in the absence of a realistic microbial community. Legionella can survive for longer periods of time at temperatures higher and lower than the growth temperature ranges indicated due to changes in their metabolic state and/or protection from thermal disinfection within biofilm or amoeba host organisms.

**N 104.2 Scalp Potential.** Where the water distribution system’s water temperature(s) range poses a scalp potential in accordance with Table N 104.2, protection shall be provided in accordance with Chapter 4.

**TABLE N 104.2**

<table>
<thead>
<tr>
<th>WATER DESCRIPTION</th>
<th>TEMPERATURE (°F)</th>
<th>SCALP POTENTIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold</td>
<td>&lt;77</td>
<td>None</td>
</tr>
<tr>
<td>Tepid Cold</td>
<td>≥77 and &lt;85</td>
<td>None</td>
</tr>
<tr>
<td>Tepid</td>
<td>≥85 and &lt;110</td>
<td>Hyperthermia is possible after long exposure in a bathtub or whirlpool tub.</td>
</tr>
<tr>
<td>Warm</td>
<td>≥110 and &lt;120</td>
<td>At 111°F, greater than 220 minutes for second-degree burn.</td>
</tr>
<tr>
<td>Tempered Hot</td>
<td>≥120 and &lt;130</td>
<td>Low</td>
</tr>
</tbody>
</table>
For SI units: °C = (°F - 32)/1.8

The infant, elderly, and infirmed have a higher potential for scalding at temperatures lower than listed.

**N-105.0 Disinfection Documentation.** Where required by the Authority Having Jurisdiction, documentation for disinfection of all building water systems shall be provided by the registered design professional in the construction documents.

**N-105.1.1 Copper-Silver Ionization.** Copper-silver ionization methods and procedures, shall include the following documentation:

1. Copper and silver ionization concentrations.
2. Methods and documentation for monitoring ion levels.
3. Electrode cleaning cycles and methods.

**N-105.1.2 Ultraviolet Light.** Ultraviolet light methods shall include the following documentation:

1. Locations of ultraviolet light units.
2. Cleaning cycles and methods of the quartz sleeves and housing.

**N-105.2 Chemical Disinfection.** Chemical biocide treatment shall be permitted to be used in accordance with the following:

1. Oxidizing biocides in accordance with manufacturer’s guidelines.
2. Non-oxidizing biocides in accordance with manufacturer’s guidelines.
3. Alternating the use of different types of biocides, dose, and frequency is recommended.
4. These treatment methods can be used for continuous, online disinfection or shock treatment online or offline.
5. Biocides intended for potable water applications shall be listed in accordance with NSF-60 and approved by the Authority Having Jurisdiction.

**N-105.3 Non-Chemical Treatment.** Non-chemical treatment devices shall be permitted to be used in accordance with manufacturer’s guidelines.

**N-105.3.1 Thermal Shock.** Thermal treatment using heat shock at 158°F (70°C) for 30 minutes shall be permitted in accordance with applicable guidelines and the Authority Having Jurisdiction.

**N-105.4 Frequency of Cleaning and Disinfection.** Where a water management plan is implemented, the frequency of cleaning and disinfection logs shall be readily accessible to the water management team and the Authority Having Jurisdiction.

**N-105.5 Control Measures.** Control measures for Legionella prevention shall be evaluated for potential consequences that affect overall health risks.

**N-201.0 Supply System Legionella Test Levels.**

**N-201.1 General.** The minimum remediation action for water supply systems shall be in accordance with Table N-201.1.

### Table N-201.1

<table>
<thead>
<tr>
<th>Percentage of Positive Legionella Test Sites</th>
<th>Remediation Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30</td>
<td>Maintain environmental assessment and Legionella monitoring in accordance with the water management plan.</td>
</tr>
</tbody>
</table>
| >=30                                        | • Immediately institute short term control measures in accordance with the direction of a qualified professional, and notify the Authority Having Jurisdiction, if required.  
• The water system shall be re-sampled no sooner than 7 days and no later than 4 weeks after disinfection to determine the efficacy of the treatment. |
• For persistent results, as determined by the Authority Having Jurisdiction, showing = 30 percent positive sites, long-term control measures\(^5\) shall be implemented in accordance with the direction of a qualified professional\(^5\) and the Authority Having Jurisdiction.
• Retreat and retest. If retest is = 30 percent positive, repeat short-term control measures.\(^2\)
• With receipt of results < 30 percent positive\(^4\), resume monitoring in accordance with the water management plan.
• For persistent results, as determined by the Authority Having Jurisdiction, showing = 30 percent positive sites, long-term control measures\(^6\) shall be implemented in accordance with the direction of a qualified professional\(^5\) and the Authority Having Jurisdiction.

Notes:
\(^1\) In the event that one or more cases of legionellosis are, or may be, associated with the facility, the sampling interpretation shall be in accordance with the direction of a qualified professional and the Authority Having Jurisdiction.
\(^2\) Short-term control measures are temporary interventions that may include, but are not limited to, heating and flushing the water system, hyperchlorination, or the temporary installation of treatment such as copper silver ionization (CSI).
\(^3\) Control measures shall be conducted in accordance with the direction of a qualified professional. A qualified professional is an Authority Having Jurisdiction licensed professional engineer; certified industrial hygienist; certified water technician; environmental consultant or water treatment professional with training and experience performing assessments and sampling in accordance with current standard industry protocols.
\(^4\) Positive samples should be minimized.
\(^5\) Long-term control measures may include supplemental disinfection treatments.

N 292.0 Emergency Response Plan:
N 292.1 General. An emergency response plan shall be provided when required by the Authority Having Jurisdiction and shall include, but not be limited to, the following:
(1) Procedures to be followed if there are cases of Legionellosis associated with the plumbing system.
(2) Procedures to be followed if the plumbing system reaches greater than or equal to 30 percent of test sites positive for Legionella.
(3) Testing for Legionella shall be performed. Procedures shall include the type of tests to be performed, sampling, and the interpretation of test results.
(4) Procedures for emergency disinfection.
(5) Procedures for other actions identified by the water management plan to prevent exposure to contaminated water.

<table>
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<tr>
<td>NSF/ANSI/CAN-60-2020</td>
<td>Drinking Water Treatment Chemicals—Health Effects</td>
<td>Water Treatment</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
Baltimore Aircoil Company (BAC) objects to the Legionella requirements contained in Appendix N. While we feel that the issue of scalding should be addressed, such requirements do not belong together in a document also covering Legionella. This will lead to confusion on the part of users of the Code. If desired, the Committee can draft a stand-alone Appendix on scalding so clear and unambiguous guidance on this issue can be better presented.

Please see attached letter dated January 3, 2022 relative to the issue of Legionella. The body of the letter is also posted below:

On behalf of Baltimore Aircoil Company, I’d like to register our objection to the proposed changes to the Uniform Plumbing Code and the Uniform Mechanical Code associated with legionella and evaporative heat rejection equipment.

After reviewing the proposed code changes and addendums to the code, our objections are based on the following:

• The complete lack of science or data justifying the increased burdens on owners and operators of heat rejection equipment and building water systems, with no meaningful expectation of a reduction of Legionnaires’ disease cases.
• The lack of a credible and responsible ANSI standard development process, failing to engage a meaningful cross section of stakeholders including subject matter experts such as heat rejection equipment manufacturers.

• Creates a conflict with the well-established ASHRAE Standard 188, developed over 12 years by a cross-section of expert stakeholders. Developed with the CDC’s involvement, ASHRAE 188 was further adopted by the CDC as the basis for their Legionella Toolkit and is increasingly being adopted by state and local jurisdictions.

• Fails to address broader system issues that drive legionella presence in our water systems, starting with source water treatment through delivery. Legionella doesn’t just materialize, it is introduced predominantly through incoming water.

• The narrow and excessive focus on heat rejection equipment unsupported by science and data, with obvious omissions of other water-based building equipment.

We believe that ASHRAE Standard 188 offers substantial and credible guidance to building owners making the effort by IAPMO counterproductive. We’d encourage IAPMO to look for opportunities to truly prevent Legionnaires’ disease by joining the growing number of organizations working to ensure legionella-free water is reliably and consistently delivered to all residents and users.

[Supporting documentation provided in KAVI for TC review]
P 101.0 General.
P 101.1 Scope. The provisions of this appendix address minimum qualifications for installers, inspectors, or employers for systems covered within the scope of this code.

P 102.0 Qualifications.
P 102.1 General. Where permits are required, the Authority Having Jurisdiction shall have the authority to require contractors, installers, or service technicians to demonstrate competency. Where determined by the Authority Having Jurisdiction, the contractor or technicians shall be licensed or certified to perform such work. Professional qualifications shall be required for an individual to demonstrate the required level of competency.
P 102.2 Inspectors and Plans Examiners. Professional qualification for plumbing inspectors and-plumbing plans examiners shall be qualified in accordance with ASSE/IAPMO/ANSI Series 16000.
P 102.2.1 Qualification for Plumbing Inspector. Professional qualification for plumbing inspectors shall be in accordance with ASSE 16010.
P 102.2.2 Qualification for Plumbing Plan Examiner. Professional qualification for plumbing plans examiners shall be in accordance with ASSE 16040.
P 102.3 Service Plumber Technician. Professional qualification for plumbing service technicians shall be qualified to ASSE/IAPMO/ANSI Series 13000.
P 102.3.1 Qualification for Service Plumbers. Professional qualification for service plumbers shall be in accordance with ASSE 13010.
P 102.4 Cross-Connection Control. Professional qualification for cross-connection control professionals shall be in accordance with ASSE/IAPMO/ANSI Series 5000.
P 102.4.1 Qualification for Backflow Testers. Professional qualification for backflow assembly testers shall be in accordance with ASSE 5110.
P 102.4.2 Qualification for Surveyors. Professional qualification for cross-connection assembly surveyors shall be qualified in accordance with ASSE 5120.
P 102.4.3 Qualification for Repairers. Professional qualification for backflow prevention assembly repairers shall be in accordance with ASSE 5130.
P 102.4.4 Qualification for Fire Protection Systems. Professional qualification for backflow assembly testers of fire protection systems shall be in accordance with ASSE 5140.
P 102.4.5 Qualification for Program Administrator. Professional qualification for backflow prevention administrator shall be in accordance with ASSE 5150.
P 102.5 Medical Gas Systems. Professional qualification for medical gas systems personnel shall be in accordance with ASSE/IAPMO/ANSI Series 6000.
P 102.5.1 Qualification for Medical Gas Installers. Professional qualification for medical gas system installers shall be in accordance with ASSE 6010.
P 102.5.2 Qualification for Bulk Medical Gas/Cryogenic Fluid Installers. Professional qualification for bulk medical gas/cryogenic fluid installers shall be in accordance ASSE 6015.

P 102.5.3 Qualification for Medical Gas Systems Inspectors. Professional qualification for medical gas systems inspectors shall be in accordance with ASSE 6020.

P 102.5.4 Qualification for Medical Gas System Verifiers. Professional qualification for medical gas system verifiers shall be in accordance with ASSE 6030.

P 102.5.5 Qualification for Bulk Medical Gas/Cryogenic Fluid Central Supply System Verifiers. Professional qualification for bulk medical gas/cryogenic fluid central supply system verifiers shall be in accordance with ASSE 6035.

P 102.5.6 Qualification for Medical Gas Systems Maintenance. Professional qualification for medical gas systems maintenance personnel shall be in accordance with ASSE 6040.

P 102.6 Residential Potable Water Fire Sprinkler System Installers and Inspectors for One- and Two-Family Dwellings. Professional qualification for residential potable water fire protection system installers and inspectors for one- and two-family dwellings shall be in accordance with ASSE/IAPMO/ANSI Series 7000.

P 102.6.1 Qualification for Installers. Professional qualification for persons who provide layout, detail and calculations for residential potable water fire protection systems for one- and two-family dwellings and install such systems shall be in accordance with ASSE 7010.

P 102.6.2 Qualification for Inspectors. Professional qualification for inspectors of residential potable water fire protection systems for one- and two-family dwelling shall be in accordance with ASSE 7020.

P 102.7 Water Management and Infection Control Risk Assessment for Building Systems. Professional qualification for construction and maintenance personnel and employers to identify and manage potentially hazardous exposure to bloodborne, waterborne and airborne pathogens. Also includes qualifications for members of a water safety team involved in the development of a risk assessment analysis, and water management and sampling plan, for protection from Legionella and other waterborne pathogens and persons who conduct a facility risk assessment and implement a water safety and management program to reduce the risk of infections due to Legionella. Qualifications are in accordance with ASSE/IAPMO/ANSI Series 12000.

P 102.7.1 Environment of Care, Infection Control and Construction Risk Assessment Professional Qualification Standard. Professional qualification for general knowledge of the environment of care, infection control and construction risk assessment procedures to protect facility operations, occupants, workers or any individual who has the potential for harm caused by construction activities shall be in accordance with ASSE 12010.

P 102.7.2 Environment of Care, Infection Control and Construction Risk Assessment Professional Qualification Standard for Construction and Maintenance Employers. Professional qualification for general knowledge of the environment of care, infection control and construction risk assessment requirements and procedures to protect facility operations, occupants, workers, or any individual who has the potential for harm caused by construction activities shall be in accordance with ASSE 12020. It also provides general knowledge of employer responsibilities to the worker and to the facility.

P 102.7.3 Water Quality Program Professional Qualifications Standard for Employers and Designated Representatives. Professional qualification for employers and designated representatives implementing water quality programs shall be in accordance with ASSE 12060.

P 102.7.4 Qualification for Water Quality Program, Plumbers. Professional qualification for plumbers implementing a water quality program shall be in accordance with ASSE 12061.

P 102.7.5 Qualification for Water Quality Program and Pipefitters. Professional qualification for pipefitters implementing a water quality program shall be in accordance with ASSE 12062.

P 102.7.6 Qualification for Water Quality Program, Sprinkler Fitters. Professional qualification for sprinkler fitters implementing a water quality program shall be in accordance with ASSE 12063.

P 102.7.7 Legionella Water Safety and Management Specialist. Professional qualification for persons who conduct a facility risk assessment and implement a water safety and management program to reduce the risk of infections due to Legionella shall be in accordance with ASSE 12080.

P 102.8 Rainwater Catchment System Personnel. Professional qualification for designers and installers of rainwater catchment systems, and inspectors of rainwater/stormwater catchment systems shall be in accordance with ASSE/IAPMO/ANSI Series 21000.

P 102.8.1 Qualification for Installer. Professional qualification for rainwater catchment systems installers shall be in accordance with ASSE 21110.

P 102.8.2 Qualification for Designer. Professional qualification for rainwater catchment system designers shall be in accordance with ASSE 21120.

P 102.8.3 Qualification for Inspectors. Professional qualification for rainwater and stormwater catchment systems inspectors shall be in accordance with ASSE 21130.
<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSE 5110-2015</td>
<td>Backflow Prevention Assembly Testers</td>
<td>Professional Qualifications</td>
</tr>
<tr>
<td>ASSE 5120-2015</td>
<td>Cross-Connection Control Surveyors</td>
<td>Professional Qualifications</td>
</tr>
<tr>
<td>ASSE 5130-2015</td>
<td>Backflow Prevention Assembly Repairers</td>
<td>Professional Qualifications</td>
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<tr>
<td>ASSE 5140-2015</td>
<td>Fire Protection System Cross-Connection Control Tester</td>
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<tr>
<td>ASSE 5150-2015</td>
<td>Backflow Prevention Program Administrators</td>
<td>Professional Qualifications</td>
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<td>ASSE 6015-2018</td>
<td>Bulk Medical Gas/Cryogenic Fluid Central Supply Systems Installers</td>
<td>Professional Qualifications</td>
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<tr>
<td>ASSE 6040-2018</td>
<td>Medical Gas Systems Maintenance Personnel</td>
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SUBSTANTIATION:
By including these Professional Qualification Standards in the Appendix of this code it creates a base line for what an AHJ may or should expect from installers and inspectors of these systems.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 17  NEGATIVE: 7  ABSTAIN: 1  NOT RETURNED: 1  Daniels

EXPLANATION OF NEGATIVE:

BALLANCO: This change should be rejected. This does not belong in the code. Furthermore, the charging statement does not address all of the listed qualification standards. Section P 102.1 states that it applies to contractors, installers, and service technicians. Then the first section applies to plans examiners and inspectors. Yet, they are not included in the charging section. The Code should never be a licensing document. If ASSE wants to put this out as a separate document, they can do so. But this does not belong in the UPC.

BARBATO: Professional qualifications are regulated by state laws and local ordinances and have no place in the code.

FEEHAN: This does not belong in the code. This is up to the Jurisdictions to determine qualifications.

GORSUCH: Professional qualifications should be decided by AHJs.

KREITENBERG: The Plumbing Code is not the appropriate body to address this type of "qualification" criteria.
RODIO: This code change is seriously flawed. It places requirements for installers to meet ASSE but provides no method of having the installers tested. The AHJ's will have to establish tracking, testing, and monitoring systems to ensure that the various installers and inspectors conform with and maintain current certifications. It mandates superseding qualifications over state and county licensing requirements. It adds another layer of administration and complexity to the installers that does nothing to benefit the end-user. As an example: As a plumber in California with a C-36 general plumbing license, I and all of my employees would have to be tested and certified as meeting ASSE 13010, ASSE/IAPMO/ANSI Series 6000, ASSE 6010, ASSE 12061, ASSE 12062, ASSE/IAPMO/ANSI Series 21000, ASSE 21110 and ASSE 21120. These are eight additional tests and certifications to install work for all of my employees that are currently covered under my license. Backflow workers are just as bad. Are AHJ’s going to have all of their inspectors tested and certified to dozens of these standards? This code change is way beyond the scope of our code.

WHITE: This is not a code issue; it is a jurisdictional issue.

EXPLANATION OF ABSTAIN:

CUDDAHY: Not sure; qualifications should be jurisdictional.

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APPENDIX P

PROFESSIONAL QUALIFICATIONS

P 102.0 Qualifications.

P 102.7 Water Management and Infection Control Risk Assessment for Building Systems. Professional qualification for construction and maintenance personnel and employers to identify and manage potentially hazardous exposure to bloodborne, waterborne and airborne pathogens. Also includes qualifications for members of a water safety team involved in the development of a risk assessment analysis, and water management and sampling plan, for protection from Legionella and other waterborne pathogens and persons who conduct a facility risk assessment and implement a water safety and management program to reduce the risk of infections due to Legionella. Qualifications are in accordance with ASSE/IAPMO/ANSI Series 12000.

P 102.7.1 Environment of Care, Infection Control and Construction Risk Assessment Professional Qualification Standard. Professional qualification for general knowledge of the environment of care, infection control and construction risk assessment procedures to protect facility operations, occupants, workers or any individual who has the potential for harm caused by construction activities shall be in accordance with ASSE 12010.

P 102.7.2 Environment of Care, Infection Control and Construction Risk Assessment Professional Qualification Standard for Construction and Maintenance Employers. Professional qualification for general knowledge of the environment of care, infection control and construction risk assessment requirements and procedures to protect facility operations, occupants, workers, or any individual who has the potential for harm caused by construction activities shall be in accordance with ASSE 12020. It also provides general knowledge of employer responsibilities to the worker and to the facility.

P 102.7.3 Water Quality Program Professional Qualifications Standard for Employers and Designated Representatives. Professional qualification for employers and designated representatives implementing water quality programs shall be in accordance with ASSE 12060.

P 102.7.4 Qualification for Water Quality Program, Plumbers. Professional qualification for plumbers implementing a water quality program shall be in accordance with ASSE 12061.

P 102.7.5 Qualification for Water Quality Program and Pipefitters. Professional qualification for pipefitters implementing a water quality program shall be in accordance with ASSE 12062.
**P 102.7.6 Qualification for Water Quality Program, Sprinkler Fitters.** Professional qualification for sprinkler fitters implementing a water quality program shall be in accordance with ASSE-12063.

**P 102.7.7 Legionella Water Safety and Management Specialist.** Professional qualification for persons who conduct a facility risk assessment and implement a water safety and management program to reduce the risk of infections due to Legionella shall be in accordance with ASSE-12080.

### TABLE 1701.2

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<th>DOCUMENT NUMBER</th>
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<td>Legionella Water Safety and Management Specialist</td>
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(portions of table not shown remain unchanged)

**SUBSTANTIATION:**

**Daryn Cline:**
Delete Section P 102.7 Water Management and Infection Control Risk Assessment for Building Systems and the associated standards, publications, practices and guides in Table 1701.2, this recommended language does not align with ASHRAE Standard 188 or ASHRAE Guideline 12. The IAPMO suggested language and standards have not been found to reduce cases of Legionnaires’ disease or reduce legionella bacteria, it also creates conflicts in the codes and standards space for the industry due to conflicts and confusion about which to follow.

**Emily Toto:**
Section P102.7, and the related standards, publication, procedures, and guides in Table 1701.2 contained in proposed Appendix P do not align with the language contained in ANSI/ASHRAE 188 Legionellosis: Risk Management for Building Water Systems and the supporting document, ASHRAE Guideline 12 Managing the Risk of Legionellosis Associated with Building Water Systems. ANSI/ASHRAE 188 and ASHRAE Guideline 12 are written to be usable and implemented by a broad range of building owners without using or requiring compliance, training, or certification in any hazard analysis, risk assessment, or risk management methodologies (See ANSI/ASHRAE 188-2021 Section 4 Compliance and ASHRAE Guideline 12 Section 2 Scope, Item 2.3), such as those contained in Section P102.7 of item #307. Note that ASHRAE has proposed revisions to UPC Appendix N, Item #305 to replace the Legionella growth text with the minimum requirements to address Legionella growth in plumbing systems contained in ANSI/ASHRAE 188, with practice informed by ASHRAE Guideline 12 and in accordance with the applicable rules and regulations, the plumbing code, and the mechanical code.

ANSI/ASHRAE 188 and the latest version of ASHRAE Guideline 12, are the result of almost three decades of development. As background, there were multiple public reviews beginning in the early 1990s and numerous independent substantive reviews to gain input and consensus. ANSI/ASHRAE 188 and ASHRAE Guideline 12 contain extensive input from industry, academia, and healthcare and from city, state, and national public health departments and regulatory authorities. ANSI/ASHRAE 188 has been subject to continuous maintenance since it was first published in 2015 and ASHRAE Guideline 12 has been subject to continuous maintenance since the 2018 edition was published. Both are published on a three-year cycle to incorporate all accepted changes. To facilitate adoption, the current version of ANSI/ASHRAE 188 is written in code enforceable language with each requirement worded to enable yes/no compliance confirmation. ANSI/ASHRAE 188 is structured to allow UPC Appendix N to address Legionella growth only in potable plumbing systems, separate from Legionella growth in mechanical systems addressed by the mechanical code.
The differences between existing ANSI/ASHRAE 188 and the associated ASHRAE Guideline 12 and the proposed Appendix P Section P102.7 and the related standards, publications, procedures, and guides in Table 1701.2 will lead to user confusion and is a violation of the ANSI Essential Requirements Document, specifically Section 2.4.

Appendix P:
1. contains requirements that are overly prescriptive;
2. contains requirements and guidance that conflict with ANSI/ASHRAE 188 and ASHRAE Guideline 12; and
3. contains requirements that unnecessarily burdens all buildings to take the same actions, even though the risk of legionellosis varies by factors such as plumbing system complexity, building occupancy/use, and many others. (ANSI/ASHRAE 188 requirements address these differences)

Note that the ASHRAE Standing Standard Project Committee (SSPC) 188 voted 22-0-1 to reject the inclusion of Appendix P into the UPC as originally proposed.

ASHRAE SSPC 188 appreciates the time spent by the IAPMO Technical Committee and the Legionella Task Group to develop the proposed language. ASHRAE SSPC 188 invites the Technical Committee to engage in a collaborative revision of the proposed code language that could be incorporated into a future code revision. Such collaboration would ensure consistency among the standards, would lessen confusion for users, and would increase the probability of a positive public health and safety outcome. SSPC 188 looks forward to working with IAPMO this important project.

PUBLIC COMMENT 2
Code Year: 2024 UPC Section #: Appendix P Item #: 307
SUBMITTER: Julius Ballanco, P.E. (JB Engineering and Code Consulting, P.C.); Greg Lowman (Baltimore Aircoil Company); Paul A Lindahl Jr (SPX CT, Rep. Cooling Technology Institute)

RECOMMENDATION:
Delete text without substitution

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

SUBSTANTIATION:
Julius Ballanco:
This change should be rejected. Licensing and qualifications do not belong in the code. The scoping or charging statement is not consistent with the listed qualification standards. Section P 102.1 states that it applies to contractors, installers, and service technicians. Then the first section applies to plans examiners and inspectors. Additional section also address inspector qualification standards. Yet, inspectors are not included in the charging section.

There is a long history of the UPC not including licensing requirements. This policy should remain.

ASSE can always develop and publish a separate document listing all their qualification standard.

Finally, there are additional qualification processes available besides ASSE. Yet, those processes are not listed making this Appendix extremely proprietary.

Greg Lowman:
P102.7 and the many of the documents referenced in Table 1701.2 contained in this proposed Appendix do not align with ASHRAE Standard 188 and ASHRAE Guideline 12, both of which do not require compliance, training, or certification in any hazard analysis, risk management methodologies. Reference Standard 188, Section 4 and Guideline 12 Scope, Item 2.3 for specific details. Additionally, all of the certification requirements appear proprietary, are from a single entity, and listing them as the only requirements for each of the areas excludes other potential beneficial certifications and training as well as any that are established on the local level. We also note the comments of those on the IAPMO Committee who voted against this proposal, as well as those who voted against a similar proposal, Item 330 of the UMC (Appendix H), stating that such requirements do not belong in the Code and are best established at the local level.
Paul A Lindahl Jr:
The Cooling Technology Institute agrees with many of the Committee Members who voted against approval of Appendix P (17-7-1-1) as such requirements are best established at the local level by the AHJ and are often covered by local laws and regulations. Additionally, only certifications from a single entity are listed which can potentially be considered a restraint of trade as this Appendix is written in code mandated language (i.e., “shall” as opposed to “should” or “may”). Furthermore, these requirements contradict the requirements of ANSI/ASHRAE Standard 188 and ANSI/ASHRAE Guideline 12, both of which the CTI supports, which both state that no additional compliance, training, or certification in any hazard analysis, risk assessment, or risk management methodologies is required (reference Standard 188-2021 Section 4 Compliance and Guideline 12 Section 2 Scope, Item 2.3). Furthermore, the differences between the existing Standard 188 and the associated Guideline 12 and the proposed Appendix J Section J 102.5 and the related standards, publications, procedures, and guides in Table 1701.2 will lead to user confusion and is a violation of the ANSI Essential Requirements Document, specifically Section 2.4.

This comment is submitted on behalf of the CTI Regulatory Committee which has been empowered by the CTI President and Board of Directors to respond to such proposals. Note that the Regulatory Committee voted unanimously to support this comment as submitted. The CTI represents many Owners and Operators, Suppliers, and Manufacturers of environmentally sustainable heat rejection solutions, none of whom to our knowledge were consulted in the development of this proposal.
**APPENDIX R**

**TINY HOUSES**

**R 101.0 Tiny Houses.** The tiny house plumbing systems shall be designed and installed in accordance with the requirements of this appendix and the requirements of this code, where applicable. Part I of this appendix shall apply to a single tiny house. Part II of this appendix shall apply to tiny house communities. The provisions of this appendix shall apply to permanent structures of 400 square feet (37 m²) or less. The provisions of this appendix shall not apply to recreational vehicles as defined in NFPA 1192. The provisions of this appendix shall not apply to recreational vehicle parks and campgrounds as defined in NFPA 1194 or to manufactured homes as defined in NFPA 501A.

**R 102.0 Definitions.**

**R 102.1 General.** For purposes of this appendix, the following definitions shall apply:

**Tiny House.** A structure, where erected, is 400 square feet (37 m²) or less.

**Tiny House, Community.** A structure(s), where erected, is 400 square feet (37 m²) or less, and of not less than two structures in the same lot.

**Tiny House, Single.** A structure, where erected, is 400 square feet (37 m²) or less, and of not more than 1 structure in a lot.

**R 103.0. General.**

**R 103.1 Construction Documents.** Before plumbing or sewage disposal facilities are installed or altered in a tiny house, duplicate construction documents shall be filed, and proper permits obtained from the department or departments having jurisdiction. Plans shall show in detail:

(1) Plot plans drawn to scale, indicating elevations, property lines, driveways, existing or proposed buildings, and the sizes of the tiny house lots.

(2) Complete specification and piping layout of proposed plumbing systems or alteration.

(3) Complete specification and layout of proposed sewage disposal system or alteration.

(4) The nature and extent of the work proposed, showing that such work will comply to the provisions of this appendix and this code, where applicable.

**R 103.2 Fuel-Gas Piping System.** The size of each section of a gas piping system shall be determined in accordance with this code, NFPA 54, or by engineering methods acceptable to the Authority Having Jurisdiction. Liquid Petroleum Gas (LP-Gas) piping systems shall be sized in accordance with NFPA 58. Oil burning systems and equipment shall be installed in accordance with NFPA 31. Gas piping systems shall be of such size and so installed as to provide a supply gas sufficient to meet the maximum demand and supply gas to each appliance inlet at not less than the minimum supply pressure required by the appliance.

**R 103.3 Water Heaters.** Water heaters shall be applied, sized, and installed in accordance with the manufacturer’s recommendations and instructions.

**R 103.4 Potable Water Sources.** Where an approved public water supply system is available, it shall be used. Alternate water sources shall be approved by a regulating agency. The supply or supplies of water shall comply with the potable water standards of the state, local health authority.
R 103.5 Water Supply to Fixtures. Except where not deemed necessary for safety or sanitation by the Authority Having Jurisdiction, each plumbing fixture shall be provided with an adequate supply of potable running water piped thereto in an approved manner.

R 103.5.1 Hot and Cold Water Required. Where plumbing fixtures are installed for private use, hot water shall be required for bathing, washing, laundry, cooking purposes, dishwashing or maintenance.

R 103.6 Storage Tanks. Where installed, water storage tanks shall be constructed of impervious materials, protected against contamination, and provided with locked, watertight covers. Overflow or ventilation openings shall be down-facing and provided with a corrosion-resistant screening of not less than number 24 mesh to prevent the entrance of insects and vermin. Water storage tanks shall not have direct connections to sewers.

R 103.7 Prohibited Connections. The potable water supply shall not be connected to a nonpotable or unapproved water supply, nor be subjected to backflow or back siphonage.

R 103.8 Backflow Prevention. No plumbing fixture, device, or construction shall be installed or maintained, or shall be connected to a domestic water supply, where such installation or connection provides a possibility of polluting such water supply or cross-connection between a distributing system of water for drinking and domestic purposes and water that becomes contaminated by such plumbing fixture, device, or construction unless there is provided a backflow prevention device approved for the potential hazard.

R 103.9 Shutoff Valve. A separate water shutoff valve shall be installed in each water service outlet at each tiny house. Where a backflow protective device is installed, the service shutoff shall be located upstream to the backflow protection device.

R 103.10 Mechanical Protection. Water service outlets, backflow preventers, and pressure-relief valves shall be protected from damage by vehicles or other causes. Such protection shall be permitted to consist of posts, fencing, or other permanent barriers.

R 103.11 Water-Treatment Equipment. Where installed, water-treatment equipment shall comply with the requirements of Section 611.0.

R 103.12 Testing. Installations of water supply, drainage, and venting systems shall be tested and inspected in accordance with this code.


R 201.0 Tiny House Fixtures.

R 201.1 Kitchen. Each tiny house shall be provided with a kitchen area and every kitchen area shall be provided with a sink in accordance with Section 420.0.

R 201.3 Bathrooms Group. Every tiny house shall contain not less than one water closet, one lavatory, and one bath, shower or combination bath/shower. The walls and shower floors shall be water-tight and waterproof in accordance with Section 408.5 and Section 408.7.

R 201.3.1 Bathroom group Clearance. Bathrooms shall have a minimum ceiling height of not less than 6 feet 8 inches (2032 mm) from the floor when measured at the center, front area of the fixtures. The ceiling height above fixtures shall not interfere with the fixture’s intended purpose.

Where a shower or combination bath/shower is installed, the ceiling height shall be not less than 6 feet 8 inches (2032 mm) where measured from the shower drain.

R 201.3.2 Bathtubs. Where installed, bathtubs or combination bath/showers shall be in accordance with Section 409.0.

R 201.3.3 Whirlpool Baths. Where installed, whirlpool baths shall be in accordance with Section 409.0.

R 201.3.4 Showers Compartments. Where installed, shower compartments, enclosures or field-constructed tile walled showers, shall be capable of fitting 30 inch diameter circle, flat on the shower base.

R 201.3.5 Water Closet. Water closets shall be in accordance with Section 411.0.

R 201.3.6 Bidets. Where installed, bidets shall be in accordance with Section 410.0.

R 201.3.7 Lavatories. Lavatories shall be in accordance with Section 407.0.

R 202.0 Tiny House Water Supply System.

R 202.1 Potable Water Supply. An accessible and approved supply of potable water shall be provided in each tiny house. Where an approved public water supply is not available, a private water supply system shall be developed and used as approved by the Authority Having Jurisdiction.

R 202.2 Water Service Outlet. Each tiny house shall be provided with a water service outlet delivering potable water. The water service outlet riser shall be not less than ¾ of an inch (20 mm) nominal pipe size and capable of delivering 12 water supply fixture units.

R 202.2.1 Water Supply Fixture Units. Water distribution systems shall be designed to deliver not less than 12 water supply fixture units to each tiny house. Plumbing materials shall be installed with materials in accordance with Chapter 3 for piping, and Chapter 4 for joints and connections.

R 202.2.2 Pressure. Each tiny house water distribution system shall be so designed and maintained at not less than 15 psig at each fixture inlet in accordance with Section 608.1. Pressures exceeding 80 psig, shall be limited in accordance with Section 608.2.
R 203.0 Tiny House Drainage System.
R 203.1 General. Plumbing fixtures shall be drained to a public sanitary waste system by gravity in accordance with Chapter 7. Private sanitary waste systems shall be in accordance with Chapter 7 or other method approved by the Authority Having Jurisdiction. See Appendix H for private sewage disposal system general guidelines.
R 203.2 Vents. All venting systems shall be in accordance with Chapter 9.
R 203.3 Engineered Design. Alternate engineered designed systems shall be in accordance with Section 301.3.
R 203.4 Materials. Drainage pipe and fittings installed underground shall be of a material approved for the purpose. Material for sanitary waste and drainage piping shall be in accordance with Table 701.2 of this code.

Part II – Tiny House Community.

R 301.0 Tiny House Community Plumbing System and Fixtures.
R 301.1 Community Facilities. Where provided, facilities for a community of tiny houses shall be in be in accordance with Section R 301.2 through Section R 301.7.1.
R 301.2 Toilet Facilities. Toilet facilities shall be provided at not less than one location, located within a 500 foot (152 m) radius from a tiny house.
R 301.2.2 Interior Finish. The interior finish of walls shall be moisture resistant to a height of not less than 4 feet (1219 mm) to facilitate washing and cleaning.
R 301.2.3 Receptacle. Each toilet room for women shall be provided with a receptacle for sanitary napkins. The receptacle shall be of durable, impervious, readily cleanable material, and shall be provided with a lid.
R 301.3 Water Closets. Public water closets shall be of an elongated bowl type and shall be provided with seats with open fronts. Water closets shall be in accordance with Section 411.0.
R 301.3.1 Size. Water closet compartments shall be not less than 30 inches (762 mm) in width. No water closet shall be set closer than 15 inches (381 mm) from its center to a side wall and shall have not less than 30 inches (762 mm) of clear space in front of each water closet.
R 301.4 Lavatories. Where water-supplied water closets are provided, an equal number of lavatories shall be provided for up to six water closets. One additional lavatory shall be provided for each two water closets where more than six water closets are required. Lavatories shall be in accordance with Section 407.0.
R 301.5 Urinals. Where separate facilities are provided for men and women, urinals shall be acceptable for not more than one-third of the water closets required in the men’s facilities, except that one urinal shall be permitted to be used to replace a water closet. Individual stall or wall-hung types of urinals shall be installed. Floor-type trough units shall be prohibited. Urinals shall be in accordance with Section 412.0.
R 301.6 Floors and Drains. The floors shall be constructed of material impervious to water and shall be easily cleanable. A building having water-supplied water closets shall be provided with a floor drain in the toilet room. This drain shall be provided with means to protect the trap seal in accordance with this code.
R 301.7 Shower Compartments. Where installed, shower compartments, regardless of shape, shall have a minimum finished interior of 1024 square inches (0.6606 m²) and shall also be capable of encompassing a 30 inch (762 mm) circle. The minimum required area and dimensions shall be measured at a height equal to the top of the threshold and a point tangent to its centerline. The area and dimensions shall be maintained to a point of not less than 70 inches (1778 mm) above the shower drain outlet with no protrusions other than the fixture valve or valves, showerheads, soap dishes, shelves, and safety grab bars, or rails. Fold-down seats in accessible shower stalls shall be permitted to protrude into the 30 inch (762 mm) circle.
Exceptions:
(1) Showers that are designed to be in accordance with ICC A117.1.
(2) The minimum required area and dimension shall not apply for a shower receptor having overall dimensions of not less than 30 inches (762 mm) in width and 60 inches (1524 mm) in length.
R 301.7.1 Drainage Connection. Shower sanitary drainage systems shall be in accordance with Chapter 7 and vents in accordance with Chapter 9. Each such area shall have an impervious, skid-resistant surface. Wooden racks (duckboards) over shower floors shall be prohibited.
R 301.8 Drinking Fountains. Where provided, drinking fountains shall be in accordance with Section 415.0.

R 302.0 Tiny House Community Potable Water Supply and Distribution.
R 302.1 Potable Water Required. Except where not deemed necessary for safety or sanitation by the Authority Having Jurisdiction, each plumbing fixture shall be provided with an adequate supply of potable running water piped thereto in an approved manner, so arranged as to flush and keep it in a clean and sanitary condition without danger of backflow or cross-connection.
Exception: Listed fixtures that do not require water for their operation and are not connected to the water supply.
R 302.2 Water Riser Pipe. Each potable water connection shall consist of a water riser pipe that is equipped with a threaded male spigot located not less than 12 inches (305 mm) but not more than 24 inches (610 mm) above grade level for the attachment of a standard water hose. The water riser pipe shall be protected from physical damage in accordance with this code. This connection shall be equipped with a listed antisiphon backflow prevention device.
R 302.3 Water Supply and Distribution. Water supply and distribution systems shall be in accordance with Chapter 6.
**R 302.3.1 Water Supply Fixture Units.** Water distribution systems shall be designed to deliver not less than 12 water supply fixture units to each tiny house. Plumbing materials shall be installed with materials in accordance with Chapter 6 for piping, and joints and connections.

**R 302.4 Approval by Authority.** No water piping supplied by a private water supply system shall be connected to any other source of supply without the approval of the Authority Having Jurisdiction, Health Department, or other department having jurisdiction.

**R 303.0 Tiny House Community Drainage System.**

**R 303.1 Required Sanitary Drainage.** Where available, tiny houses shall be connected to a public sanitary drainage system.

**R 303.2 Materials.** Pipe and fittings installed in the drainage system shall be of material conforming to the requirements of Table 701.2 or as approved by the Authority Having Jurisdiction. The drainage system shall be installed in accordance with this code.

**R 303.3 Pipe Sizes.** Water supply and distribution lines shall be sized in accordance with Chapter 6, Appendix A, Appendix C, or Appendix M of this code.

**R 303.4 Traps and Cleanouts.** Traps and cleanouts shall be provided in accordance with Chapter 7 of this code. Traps shall also be in accordance with Chapter 10.

**R 303.5 Location.** Sewer lines shall be installed in a location that will be protected from damage by vehicular traffic.

**R 303.6 Protection.** The sewer riser pipes not in use shall be firmly embedded in the ground and protected against damage from movement. Unused sewer riser pipes shall be capped or plugged with a tight-fitting plug or cap, to prevent gases from escaping. The cap or plug shall be secured by a durable chain (or equivalent) to prevent loss.

### TABLE 1701.2

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**SUBSTANTIATION:**

This appendix for Tiny Houses will correlate with the approved appendix accepted by the NSPC Technical Committee for their 2021 Edition of the NSPC.

The proposed appendix will assist a builder or enforcing agency ensure that plumbing systems for tiny houses are being installed in a safe manner with listed fixtures. Currently, no provisions exist to assist the end user building a tiny house with regards to minimum plumbing standards, and safe practices. Providing guidance for the tiny house communities will provide safe and reliable plumbing systems by requiring appropriate listed fixtures that are known to have to approved type of materials to prevent any contamination to the potable water system. Additionally, potable water should be protected, and regulations towards protecting the potable water system is not only important to the end user, but the water supplier as well. This appendix gives a foundation to establish safe practices and requirements that will keep habitants safe, healthy, and ensure a reliable plumbing system.

Tiny homes are becoming more popular and a need to address plumbing provisions is required for these specific types of structures since they are not considered Manufactured homes, Recreational Vehicles, or campgrounds. These homes are unique as classified by the building code and plumbing provisions specifically addressing these types of homes is required as no provisions address these specific dwellings.

**COMMITTEE ACTION:** REJECT

**COMMITTEE STATEMENT:**

The proposal is being rejected as there are extensive modifications required. The Committee requests that the proposed modifications be submitted as a public comment.

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

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**Appended Comments**

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APPENDIX R
TINY HOUSES

R 101.0 Tiny Houses.
R 101.1 Applicability. This appendix shall apply to structures permanently attached to a foundation. The tiny house plumbing systems shall be designed and installed in accordance with the requirements of this appendix and the requirements of this code. The provisions of this appendix shall apply to permanent structures of 400 square feet (37 m²) or less. The provisions of this appendix shall not apply to recreational vehicles as defined in NFPA 1192 or to manufactured homes as defined in NFPA 501A.

R 102.0 Definitions.
R 102.1 General. For purposes of this appendix, the following definition shall apply:
Tiny House. A single family dwelling that is not greater than 400 square feet (37 m²), not including loft area.

R 103.0 General.
R 103.1 Permits and Construction Documents. Permits and construction documents shall be submitted and approved in accordance with Section 104.0.
R 103.2 Fuel-Gas Piping System. Gas piping system shall be sized and installed in accordance with Chapter 12.
R 103.3 Water Heaters. Water heaters shall be installed in accordance with Chapter 5 and the manufacturer’s recommendations and instructions.
R 103.4 Potable Water Sources. Where a public water supply system is available, it shall be used. Private or alternate water sources shall comply with the potable water standards of the state, and local health authority.
R 103.5 Water Supply to Fixtures. Each plumbing fixture shall be provided with an adequate supply of potable water in accordance with Chapter 6.
R 103.7 Protection of Potable Water. The potable water supply shall be protected from pollution and contamination in accordance with Section 602.0 and Section 603.0. Backflow prevention shall be in accordance with Table 603.2.
R 103.8 Water-Treatment Equipment. Where installed, water-treatment equipment shall comply with the requirements of Section 611.0.
R 103.9 Testing. Installations of water supply, drainage, and venting systems shall be tested and inspected in accordance with the requirements of this code.

R 201.0 Tiny House Fixtures.
R 201.1 Fixtures. Plumbing fixtures shall comply with the requirements of Chapter 4.
R 201.2 Kitchen. Each tiny house shall be provided with a kitchen sink.
R 201.3 Bathroom. Each tiny house shall be provided with not less than one water closet, one lavatory, and one bath, shower or combination bath/shower.
R 201.4 Bathtubs and Whirlpool Bathtubs. Where installed, bathtubs and whirlpool bathtubs shall be in accordance with Section 409.0.
R 201.5 Showers Compartments. Where installed, shower compartment enclosures shall be not less than 30 inches (762 mm) wide by 30 inches (762 mm) long.
R 201.6 Water Closet. Water closets shall be in accordance with Section 411.0.
R 201.7 Lavatories. Lavatories shall be in accordance with Section 407.0.

R 202.0 Tiny House Water Supply System.
R 202.1 Water Service Outlet. Each tiny house shall be provided with a water service outlet delivering potable water. The water service outlet riser shall be not less than ¾ of an inch (20 mm) nominal pipe size.
R 202.2 Sizing Water Supply and Distribution Systems. Water distribution systems shall be sized in accordance with Section 610.0. Water supply piping, joints, and connections shall be installed in accordance with Chapter 6.
R 202.3 Pressure. Each tiny house water distribution system shall be so designed and maintained at not less than 15 pounds force per square inch (psi) (103 kPa) at each fixture inlet in accordance with Section 608.1. Water pressure exceeding 80 psi (552 kPa), shall be limited in accordance with Section 608.2.
R 203.0 Tiny House Drain, Waste, and Vent (DWV) System.
R 203.1 General. Sanitary drain, waste, and vent (DWV) systems shall be installed in accordance with Chapter 7 and Chapter 9. The DWV system shall connect to the public sanitary waste system. Private sewage disposal systems shall be permitted where approved by the Authority Having Jurisdiction. See Appendix H for private sewage disposal system general guidelines.

SUBSTANTIATION:
The proposed modification removes overly stringent, unenforceable, and repetitive language. The final draft is written in a more concise, enforceable manner to guide the end user to the appropriate provisions for plumbing systems of tiny houses.

Part II of the original submission was removed as it went beyond the tiny houses. Although there are tiny home communities, the concentration should be to each tiny house, not for the community lot. Requirements for those communities are addressed elsewhere in other codes. The language was revised to concentrate only on tiny houses.

Additionally, provisions for dimensions were removed as this appendix is for the DWV systems of tiny houses. Structural dimensions are addressed in the building or other codes.

As specified in the original substantiation, these homes are unique as classified by the building code and plumbing provisions specifically addressing these types of homes is required as no provisions currently address plumbing systems for these specific dwellings. This appendix will give the end user concrete direction as to what is required to design a safe and resilient plumbing system for tiny houses.
APPENDIX S
COMPOSTING TOILET AND URINE DIVERSION SYSTEMS

S 101.0 General.

S 101.1 Applicability. The provisions of this section shall apply to the design, construction, performance, alteration, and repair of composting toilet and urine diversion systems.

S 201.0 Definition of Terms. For the purposes of this code, the definitions in Section S 201.1 shall apply to this appendix.

No attempt is made to define ordinary words, which are used in accordance with their established dictionary meanings, except where a word has been used loosely, and it is necessary to define its meaning as used in this appendix to avoid misunderstanding.

The definitions of terms are arranged alphabetically according to the first word of the term.

S 201.1 Definitions.

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

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

Composting Toilet System. A system designed to safely collect and process excreta and compost additives into humus through aerobic decomposition.

Compost Processor. The site of aerobic decomposition transforming excreta and compost additives into humus.

Desiccation. The process of dehydrating excreta or leachate.

Diverted Urine. Urine that is collected and has not made contact with feces.

Excreta. Includes but is not limited to urine, feces, menses, toilet paper, and other human body emissions and biodegradable cleaning products.

Humus. The biologically decomposed, soil-like output of the compost processor.

Leachate. Liquid draining from the compost processor.

Secondary Composting. Additional retention and continued decomposition of humus removed from compost processors in order to meet a safe retention time.

Site-Built. Constructed at the site of use.

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

Urine Diversion. Separation of urine from other excreta that occurs at the commode.

Vectors. An organism that has the potential to transmit disease.

S 301.0 Design and Construction.

S 301.1 Requirements. Composting toilets, composting toilet systems, and urine diversion systems shall meet the design, construction, and performance requirements of Section S 301.1.1 or Section S 301.1.2.

S 301.1.1 Listed Composting Toilets and Composting Toilet Systems. Composting toilets and composting toilet systems shall be listed to NSF 41.
**S 301.1 **Composting Toilet System Design. Composting toilet and urine diversion systems complying with Section S 301.1 shall be designed by a person registered or licensed to perform plumbing design work or who demonstrates competency to design composting toilet and urine diversion systems.

**S 301.2 **System Materials and Components. Pipe, pipe fittings, traps, fixtures, material, and devices used in composting toilet and urine diversion systems that are expected to contact leachate or diverted urine shall be listed or labeled (third-party certified) by a listing agency (accredited conformity assessment body), unless otherwise approved by the Authority Having Jurisdiction. Materials and components shall comply to approved applicable recognized standards referenced in this code and shall be free from defects. Unless otherwise provided for in this code, materials, fixtures, or devices used or entering into the construction of plumbing systems, or parts thereof, shall be submitted to the Authority Having Jurisdiction for approval.

**S 301.3 **System Design. Composting toilet and urine diversion systems complying with Section S 301.1 shall be designed in accordance with the owner's manual in accordance with Section S 301.6.

**S 301.4 **Permit. It shall be unlawful for anyone to construct, install, alter, or cause to be constructed, installed, or altered any composting toilet and urine diversion system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction

**S 301.5 **Maintenance and Inspection. Composting toilet and urine diversion systems and components shall be maintained and inspected in accordance with Section S 301.5.1 through Section S 301.5.3.

**S 301.5.1 **Maintenance Responsibility. The required maintenance and inspection of composting toilet and urine diversion systems shall be the responsibility of the property owner, unless otherwise required by the Authority Having Jurisdiction. The property owner is responsible for retaining test result records in accordance with Section S 401.6.2 and making them available to the Authority Having Jurisdiction upon request. Upon transfer of property or tenancy, all test records shall be transferred and humus shall be re-tested after its first treatment period and a record retained.

**S 301.5.2 **Operation. Composting toilet and urine diversion systems shall be operated in a safe and sanitary condition in accordance with the owner's manual in accordance with Section S 301.6.

**S 301.5.3 **Inspection. In the event of a nuisance complaint or documented system failure, the composting toilet and urine diversion system shall be made available for inspection and the owner or owner's agent shall conduct sufficient repairs or alterations to the composting toilet system. At the request of the Authority Having Jurisdiction, results of all laboratory testing and new tests in accordance with Section S 301.6 following repairs to alleviate dangerous or unsanitary conditions shall be provided at the owner's expense.

**S 301.6 **Operation and Maintenance Manual. An owner's manual shall present clear instructions for maintenance and be transferred to the new owner upon transfer of property or tenancy. The owner's manual shall include:

1. Schedule for addition of necessary compost additives.
2. Source or provider of necessary compost additives. Source may be on-site.
3. Schedule and instructions for all regular maintenance tasks.
4. Expected input of and capacity for excreta and compost additives to compost toilet system specifying loading of commode(s) and compost processor(s).
5. Plan for container transfer and cleaning where transfer is used.
6. Expected schedule for removing humus from composting processors and where used secondary composting bins.
7. Plan for on-site disposal of humus or professional removal.
9. Plan for microbial testing in accordance with Section S 401.6.2.

**S 400.0 **Composting Toilet System Design.

**S 401.1 **Requirements. The design and installation of composting toilet systems shall be in accordance with Section S 401.2 through Section S 401.7.

**S 401.2 **Corrosion Resistance. All components expected to contact excreta or leachate shall be constructed of corrosion-resistant material such as stainless steel or durable polymers. Concrete in contact with excreta or leachate shall meet requirements of Section S 401.3.

**S 401.3 **Concrete Construction. Concrete construction shall be reinforced, watertight and able to withstand loading weight. Where drainage is required, the processor floor shall be sloped not less than ¼-inch per foot (20.8 mm/m). The flange of each sub-drain shall be set level.

**S 401.4 **Commodies.

**S 401.4.1 **Odor. Commode design or use shall mitigate the infiltration of odors into the building during normal operation and in the event of temporary power failure.

**S 401.4.2 **Contact. Commodes shall transport excreta into the compost processor or contain excreta for transfer as designed according to the owner’s manual.

**S 401.4.3 **Vectors. Commodes shall limit vectors and prevent human contact except for regular maintenance as designed according to the owner’s manual.

**S 401.5 **Compost Processors. Compost processors shall be designed in accordance with Sections S 401.5.1 through S 401.5.9 and shall maintain unsaturated aerobic composting conditions within the compost mass, through the drainage, absorption, or desiccation of leachate, and aeration of the processor.
S 401.5.1 Leachate. Leachate shall be collected for removal or recirculation within the processor, evaporated, or drained to an approved plumbing drainage system or other location approved by the Authority Having Jurisdiction. Leachate storage tanks shall be constructed and installed in accordance with the following:

S 401.5.1.1 Venting. Leachate storage tanks shall be vented as required for pressure equalization. When required, vents shall be installed on leachate storage tanks and shall extend from the top of the tank. The connection of storage tank vents to the plumbing venting system shall be 6 inches (152 mm) above the flood level rim of the highest fixture. Vents extending to the outdoor shall terminate no less than 12 inches (305 mm) above grade. The vent terminal shall be directed downward and covered with a 3/32 inch (2.38 mm) mesh screen to prevent the entry of vermin and insects.

S 401.5.1.1.1 Vent Size. Pressure equalization vents that prevent nitrogen loss by the use of restrictions, or of piping or tubing that is less than the minimum pipe diameter required in the plumbing code shall be approved by the Authority Having Jurisdiction.

S 401.5.1.2 Overflow. Where storage tank overflows are installed, they shall be connected to the plumbing drainage system.

S 401.5.1.2.1 Backwater Valve. Storage tank overflows, when subject to backflow, shall be provided with a backwater valve at the point of connection to the plumbing drainage system. The backwater valve shall be accessible for inspections and maintenance.

S 401.5.1.3 Construction. Leachate storage tanks shall be constructed of polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polyamide (Nylon) or a blend of PET, PEN, ethyl vinyl alcohol (EVOH), Nylon, HDPE, or other tanks listed or certified to US 49 CFR 178.274 Specifications for UN?Portable Tanks.

S 401.5.1.4 Above Grade. Above grade storage tanks are prohibited where subject to freezing conditions, or shall be provided with an adequate means of freeze protection. The above grade leachate storage tank shall be provided with an audible and visual high-water alarm.

S 401.5.1.5 Below Grade. Leachate storage tanks installed below grade shall be structurally designed to withstand all anticipated earth or other loads. Tank covers shall be capable of supporting an earth load of not less than 300 pounds per square foot (lb/ft²) (1465 kg/m²) when the tank is designed for underground installation. Below grade leachate tanks installed underground shall be provided with manholes. The manhole opening shall be a minimum diameter of 20 inches (508 mm) and located a minimum of 4 inches (102 mm) above the surrounding grade. The surrounding grade shall be sloped away from the manhole. Underground tanks shall be ballasted, anchored, or otherwise secured, to prevent the tank from floating out of the ground when empty. The combined weight of the tank and hold down system should meet or exceed the buoyancy force of the tank. The below grade leachate storage tank level shall be provided with an audible and visual high-water alarm.

S 401.5.1.6 Marking. Where openings are provided to allow a person to enter the tank, the opening shall be marked with the following words: "DANGER – CONFINED SPACE."

S 401.5.1.7 Openings. All openings shall be covered and secured to prevent tampering. Openings shall be screened or covered to prevent rodent, vermin, and insect infiltration and be protected against unauthorized human entry.

S 401.5.2 Vectors. The compost processor shall be designed and installed to limit vector access through management as required in the owner's manual.

S 401.5.3 Transfer. Where unfinished excreta or diverted urine is transferred between processors or from commode to processor, transfer and cleaning of containers and provisions for limiting user exposure shall be according to the owner's manual.

S 401.5.4 Watertightness. Processors shall be constructed of watertight material in accordance with Section S 401.2.

S 401.5.5 Vermin (Rodent) Proofing. The compost processor shall be protected to prevent the entrance of rodents, vermin, and insects. No unsecured opening other than vents, drainage, or commode may exceed ½ inch (12.7 mm) in the least dimension.

S 401.5.6 Active Conditions. The compost processor or processors shall be sized to compost excreta for a minimum of one year of biologically active conditions. Biologically active conditions are at or above a daily average of 42°F (5.56°C). Exception: Systems with shorter retention shall be permitted where either,

(1) humus from the compost processor has been tested according to Section S 401.6.2 and there is either a secondary composting stage where humus is retained in a well maintained compost bin or other facility designated for the exclusive purpose of containing humus removed from the compost processor, or

(2) humus is removed off site for processing or disposal at an approved facility.

S 401.5.7 Secondary Composting. Humus to be transferred to secondary composting shall first be tested according to Section S 401.6.2. Secondary composting shall be labeled and protected from human contact. Contact with precipitation and surface waters is prohibited.

S 401.5.8 Ventilation. Negative ventilation between the commode and compost processor shall be provided when the compost processor is connected directly to the commode without a trap. ComMODEs that are not connected to the compost processor do not require a vent.

S 401.5.8.1 Vent Terminals. Vent stacks shall terminate exterior the building as required by the plumbing or mechanical code.

S 401.5.9 Sizing. The compost processor shall be sized to accommodate the maximum daily adult usage as specified by the manufacturer's published ratings. Site built compost processors shall be sized to hold a minimum of 10 gallons (37.8 L) of material per person per year while allowing for the removal of the humus, or as specified by the system designer.
S 401.6 Testing. Composting toilet systems shall be tested in accordance with Section S 401.6.1 and Section S 401.6.2.

S 401.6.1 Compost Processors. Compost processors shall be tested for water tightness by filling the system to the maximum designed liquid storage capacity of the unit for a duration of 24 hours.

S 401.6.2 Humus. The owner or owner’s agent of the composting toilet system shall verify user’s compliance with the manufacturer’s maintenance and operation manual in accordance with Section S 403.7 by submitting a sample of the humus from the first treatment period after a minimum of one year of biologically active conditions to a certified laboratory before removal of humus from the composting processor. Where multiple compost processors are used, the humus sample shall be removed from the last compost processor. The sample collection shall be tested in accordance with EPA/625/R-92/013, Appendix F, Section 1.2. Humus shall not have a moisture content exceeding 75 percent by weight and shall not exceed 200 fecal coliforms/gram.

S 401.7 Humus Removal. Humus shall be removed according to the owner’s manual. Humus from the compost processor used around ornamental shrubs, flowers, trees, or fruit trees shall be mixed with soil or mulch and covered with no less than 3 inches (76 mm) of cover material. Depositing humus from any composting toilet system around any edible vegetable or vegetation shall be prohibited.

S 501.0 Urine Diversion System Design.

S 501.1 Requirements. The design and installation of urine diversion systems shall be in accordance with Section S 501.2 through Section S 501.14.

S 501.2 Purpose. The purpose of this section is to enable the installation of urine diversion and collection systems to improve the function of composting toilet systems and prevent nutrient pollution of ground and surface waters.

S 501.3 Material Requirements. Material used for urine diversion shall be impermeable and resistant to corrosion from urine.

S 501.4 Identification. All urine diversion piping shall be identified.

S 501.5 Change of Direction. Changes in direction of urine diversion piping shall be made by a long-sweep 90 degree (1.57 rad) fitting or other approved fittings of equivalent sweep.

S 501.6 Sizing. Pipe sizes shall be in accordance with the plumbing code. Each urine diversion fixture shall be rated as one drainage fixture unit. Piping or tubing for urine diversion that is less than the minimum pipe diameter required in the plumbing code shall be approved by the Authority Having Jurisdiction.

S 501.7 Traps. Fixtures discharging into urine diversion piping connected to the plumbing drainage system shall be trapped and vented according to the plumbing code.

S 501.8 Grade of Horizontal Piping. Urine diversion piping shall be installed at a minimum grade of ½ inch per foot (41.6 mm/m), or 4 percent toward the point of disposal.

S 501.9 Cleanouts. A cleanout shall be provided at the upper terminal of each drain line, every 50 feet (15 240 mm) and at an aggregate horizontal change of direction exceeding 135 degrees (2.36 rad).

S 501.10 Venting. Commode fixtures without traps that require ventilation shall be connected to either a dry toilet ventilation stack or a urine diversion ventilation stack. Nonwater urinals used as urine diversion systems shall be connected to a dry toilet ventilation stack or a urine diversion ventilation stack.

S 501.11 Discharge. A urine-diversion system shall be diverted to a storage tank or discharge to an approved plumbing drainage system.

S 501.12 Urine Storage Tanks. Urine storage tanks shall be constructed and installed in accordance with Section S 501.12.1 through Section S 501.12.8.

S 501.12.1 Venting. Urine storage tanks shall be vented as required for pressure equalization. When required, vents shall be installed on urine storage tanks and shall extend from the top of the tank. The connection of storage tank vents to the plumbing venting system shall be six inches above the flood level rim of the highest fixture. Vents extending to the outdoor shall terminate no less than 12 inches (305 mm) above grade. The vent terminal shall be directed downward and covered with a 3/32 inch (2.38 mm) mesh screen to prevent the entry of vermin and insects.

S 501.12.1.1 Vent Size. Pressure equalization vents that prevent nitrogen loss by the use of restrictions, or of piping or tubing that is less than the minimum pipe diameter required in the plumbing code shall be approved by the Authority Having Jurisdiction.

S 501.12.2 Traps. Urine storage tanks shall prevent odors and nitrogen loss from the tank inlet by means of a P-trap, mechanical trap, submerged inlet piping, or other means approved by the Authority Having Jurisdiction. Submerged inlet piping shall remain submerged during use and after pumpout.

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

S 501.12.3 Overflow. Where storage tank overflows are installed, they shall be connected to a plumbing drainage system.

S 501.12.3.1 Backwater Valve. Storage tank overflows subject to backflow shall be provided with a backwater valve at the point of connection to the plumbing drainage system when connected to a public sewer system or on-site wastewater system. The backwater valve shall be accessible for inspections and maintenance.

S 501.12.4 Construction. Urine storage tanks shall be constructed of polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polyamide (Nylon) or a blend of PET, PEN, ethyl vinyl alcohol (EVOH), Nylon, HDPE, or other tanks listed or certified to US 49 CFR 178.274 Specifications for UN Portable Tanks.
S 501.12.5 Above Grade. Above grade storage tanks shall be prohibited where subject to freezing conditions, or shall be provided with an adequate means of freeze protection. The above grade urine storage tank shall be provided with an audible and visual high-water alarm.

S 501.12.6 Below Grade. Urine storage tanks installed below grade shall be structurally designed to withstand all anticipated earth or other loads. Tank covers shall be capable of supporting an earth load of not less than 300 pounds per square foot (lb/ft²) (1465 kg/m²) when the tank is designed for underground installation. Below grade urine tanks installed underground shall be provided with manholes. The manhole opening shall be a minimum diameter of 20 inches (508 mm) and located a minimum of 4 inches (102 mm) above the surrounding grade. The surrounding grade shall be sloped away from the manhole. Underground tanks shall be ballasted, anchored, or otherwise secured, to prevent the tank from floating out of the ground when empty. The combined weight of the tank and hold down system should meet or exceed the buoyancy force of the tank. The below grade urine storage tank level shall be provided with an audible and visual high-water alarm.

S 501.12.7 Marking. Where openings are provided to allow a person to enter the tank, the opening shall be marked with the following words: “DANGER – CONFINED SPACE.”

S 501.12.8 Openings. All openings shall be covered and secured to prevent tampering. Openings shall be screened or covered to prevent rodent infiltration and be protected against unauthorized human entry.

S 501.13 Maintenance Plan. Every urine diversion system shall have a maintenance plan that includes both a pumpout schedule and contract, or an onsite discharge plan. The maintenance plan shall also include a pipe cleaning schedule.

S 501.14 Treatment, Reuse, and Disposal. Where urine is to be reused onsite, a treatment method for sanitization shall be included in the owner's manual. Approved methods of treatment shall include:
1. Retention without addition for six months before usage. Two or more holding tanks shall be required for retention.
2. Application to the compost processor.
3. Pasteurization to 158°F (70°C) for thirty minutes.
4. Other method approved by the Authority Having Jurisdiction.

S 601.0 Composting Toilet and Urine Diversion Inspection Checklist.

S 601.1 Applicability. This appendix provides an inspection checklist for composting toilet and urine diversion systems designed in accordance with Section S 301.1.2. This is only a general checklist and is not intended to address all the provisions required by Section S 301.1.2.

S 601.2 Composting Toilet and Urine Diversion Inspection Checklist. This section includes the inspection checklist form.

COMPOSTING TOILET AND URINE DIVERSION INSPECTION CHECKLIST

System Materials and Components
- Verify that the system is approved by the Authority Having Jurisdiction as indicated in the approved design.
- All components expected to contact excreta or leachate shall be constructed of corrosion resistant material such as stainless steel or durable polymers (ABS, PVC Schedule 40, Polypropylene, High-density polyethylene, Fiber-reinforced polyester, or material of equivalent durability).

Concrete Construction
- Verify site built concrete mix, loading weight.
- Site built concrete construction shall be reinforced and without cracking, spalling or other observed faults.
- Verify site built concrete watertightness.
- Verify site built concrete adequate drainage where required; Floors of processors shall be sloped not less than ¼-inch per foot (20.8 mm/m). Note: The flange of each sub-drain shall be set level.

Commode
- If commode uses repurposed container for transporting excreta into compost processor, container meets third part listing by a listing agency, including US 49 CFR 178.274 Specifications for UN Portable Tanks.

Compost Processors
- Compost processors shall have a leachate collection, recirculation, evaporation, or drainage system. See also Leachate Storage Tank checklist.
- Compost processor is rodent proof. No unsecured opening other than vents, drainage, or commode may exceed ½ inch (12.7 mm) in the least dimension.
- All composting processors shall be labeled and protected from human contact, surface water and precipitation.
- Compost processor must pass a water tightness test by filling the system to the maximum designed liquid storage capacity of the unit for a duration of 24 hours.
- Where unprocessed excreta or diverted urine is transferred from commode to processor(s), provide tools and cleaning materials as described in the owner's manual.
- Commodes connected to compost processor without a trap shall maintain negative ventilation. If compost processor is not connected to the commode no vent is required.
Leachate Storage Tanks
- Leachate storage tanks, where provided, shall be constructed of polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polyamide (Nylon) or a blend of PET, PEN, ethyl vinyl alcohol (EVOH), Nylon, HDPE, or other tanks listed or certified to US 49 CFR 178.274 Specifications for UN Portable Tanks.
- Above grade storage tanks are prohibited where subject to freezing conditions or shall be provided with an adequate means of freeze protection. The above grade leachate storage tank shall be provided with a high-water alarm. The alarm shall report when 80 percent volume is reached.
- Where openings are provided to allow a person to enter the tank, the opening is marked "DANGER – CONFINED SPACE."
- All openings are covered and secured to prevent tampering. Openings shall be screened or covered to prevent rodent infiltration and be protected against unauthorized human entry.
- Below grade storage tanks shall be in accordance with the approved design.
- If pressure equalization vents are specified in the design, they are installed as designed.
- The connection of storage tank vents to the plumbing venting system shall be six inches above the flood level rim of the highest fixture.
- Vents extending to the outdoor shall terminate no less than 12 inches (305 mm) above grade.
- If storage tank overflows are installed they shall be connected to the plumbing drainage system.
- Storage tank overflows shall be provided with a backwater valve or check valve at the point of connection to the plumbing drainage system when connected to a public sewer system. The backwater valve shall be accessible for inspections and maintenance.

Urine Storage Tanks
- Below grade urine storage tanks shall be in accordance with the approved design.
- Above grade storage urine storage tanks are constructed of polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polyamide (Nylon) or a blend of PET, PEN, ethyl vinyl alcohol (EVOH), Nylon, HDPE, or other tanks listed or certified to US 49 CFR 178.274 Specifications for UN Portable Tanks.
- Above grade storage tanks are prohibited where subject to freezing conditions or shall be provided with an adequate means of freeze protection.
- If a vent is required for pressure equalization, then the vent shall extend above the top of the tank.
- The connection of storage tank vents to the plumbing venting system shall be six inches above the flood level rim of the highest fixture.
- Vents extending to the outdoor shall terminate no less than 12 inches (305 mm) above grade.
- Vent terminal is directed downward and covered with a 3/32 inch (2.38 mm) mesh screen to prevent the entry of vermin and insects.
- Pressure equalization vents that prevent nitrogen loss by the use of restrictions or use of piping or tubing that is less than the minimum pipe diameter required in the plumbing code shall be approved by the Authority Having Jurisdiction.
- If storage tank overflows are installed they shall be connected to a plumbing drainage system.
- Storage tank overflows shall be provided with a backwater valve or check valve at the point of connection to the plumbing drainage system when connected to a public sewer system.
- The backwater valve is accessible for inspections and maintenance.
- Storage tank trap is a P-trap, mechanical trap, submerged inlet piping, or other means approved by the Authority Having Jurisdiction. Urine storage tanks of five gallons or less connected to fixtures with active ventilation or having an integrated seal do not require traps.
- If submerged inlet piping is used as trap, the inlet piping must remain submerged during use and after pumpout.

Urine Diversion System
- Material used for urine diversion shall be stainless steel or non-metallic pipe. Concrete piping is prohibited.
- Urine diversion piping is identifiable and labeled. Pipe diameters are sized in accordance with Authority Having Jurisdiction and the plumbing code.
- Where unprocessed urine is transferred from commode to processor(s), provide tools and cleaning materials as described in the owner's manual.
- Changes in direction of urine diversion piping shall be made by a long-sweep 90 degree (1.57 rad) fitting or other approved fittings of equivalent sweep.
- Fixtures discharging into urine diversion piping connected to the plumbing drainage system shall be trapped and vented according to the plumbing code.
- Urine diversion piping is installed at a minimum grade of ½ inch per foot (41.6 mm/m), or 4 percent toward the point of disposal.
Urine is diverted to a storage tank or an approved plumbing drainage system.
A maintenance plan shall be included per the design system.

Cleanouts
- Cleanouts installed at each aggregate horizontal change of direction exceeding 135 degrees (2.36 rad).
- A cleanout provided at the upper terminal of each drain line every 50 feet (15 240 mm).

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

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

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

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

Annual Maintenance
- Plan for container transfer and cleaning where transfer is used.
- Expected schedule for removing humus from composting processors and where used secondary composting bins.
- Plan for on-site disposal of humus or professional removal.
- Plan for managing leachate.
- Special conditions: cold climate operation and/or winterization.

Testing
- Plan for microbial testing.
- Humus Sampling.
- A laboratory is under contract to perform testing of finished compost.
- A sample of the previous treatment period shall be on-hand with fecal coliform/gram results.

Troubleshooting
- Guide to troubleshooting basic operating functions.

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<td>EPA/625/R-92/013-2003</td>
<td>Control of Pathogens and Vector Attraction in Sewage Sludge</td>
<td>Miscellaneous</td>
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</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
Composting toilets are widely used as an alternative where direct connection to private or local sewer systems are just not feasible. These provisions are important to persons who run into this situation and the addition of these established code requirements that have been in the WeStand will assist the end user to design and take the appropriate steps in designing a safe system. Dealing with waste is a serious health concern and should be referenced in the UPC as a new appendix. These provision will harmonize with the latest WeStand provision for composting toilets.

COMMITTEE ACTION: REJECT
COMMITTEE STATEMENT:
The substantiation is not sufficient to justify the addition of this language. These systems may not apply the DWV provisions in the code.

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 22  NEGATIVE: 3  NOT RETURNED: 1  Daniels

EXPLANATION OF NEGATIVE:
BALLANCO: This is a good change that should be included in the appendix.

GORSUCH: This proposal provides important information for those who live in conditions that lack hard piped plumbing facilities, and provides guidance to safeguard public health; it should be in an appendix.

KREITENBERG: This is an item for the appendix of the Code.

---

Appended Comments

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PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Appendix S, Table 1701.2

SUBMITTER: Pat Lando
Recode
Rep. Chair, WE-stand NonTraditional Toilets Task Group

RECOMMENDATION: Add new text

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

SUBSTANTIATION:
Composting toilets are widely used as an alternative where direct connection to private or local sewer systems are just not feasible. These provisions are important to persons who run into this situation and the addition of these established code requirements that have been in the WeStand will assist the end user to design and take the appropriate steps in designing a safe system. Dealing with waste is a serious health concern and should be referenced in the UPC as a new appendix. These provision will harmonize with the latest WeStand provision for composting toilets.
Proposals

Item #: 327

UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: Carlton Ramcharran/Angel Guzman
ASME

RECOMMENDATION:
Revise text

### TABLE 1701.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<tr>
<td>ASME A112.1.3-2000 (R2015)-(R2019)</td>
<td>Air Gap Fittings for Use with Plumbing Fixtures, Appliances, and Appurtenances</td>
<td>Fittings</td>
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<td>ASME A112.4.2-2015/CSA B45.16-2015 (R2020)</td>
<td>Personal Hygiene Devices for Water Closets</td>
<td>Fixtures</td>
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<td>ASME A112.6.3-2016</td>
<td>Floor and Trench Drains</td>
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<td>ASME A112.6.7-2010 (R2015) (R2019)</td>
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<td>Joints</td>
<td>605.1.5, 605.2.3, 605.5.2, 605.12.3, 705.1.3, 705.3.4, 705.4.2, 705.6.3, 1208.6.9, 1322.5(2)</td>
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<td>1308.2(9)</td>
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<tr>
<td>ASME BPVC Section VIII.1-2017-2019</td>
<td>Rules for Construction of Pressure Vessels - Division 1</td>
<td>Miscellaneous</td>
<td>505.4, 1309.5(2), 1310.4(2), 1312.3(2)</td>
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<tr>
<td>ASME BPVC Section IX-2017-2019</td>
<td>Welding, Brazing, and Fusing Qualifications - Qualification Standard for Welding, Brazing, and Fusing</td>
<td>Miscellaneous</td>
<td>1322.1.1, 1322.2.1,</td>
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(portions of table not shown remains unchanged)

Note: The ASME standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

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<td>Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300</td>
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<td>Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems</td>
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<td>ASME BPVC Section IV-2015</td>
<td>Rules for Construction of Heating Boilers</td>
<td>Miscellaneous</td>
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</table>

Substantiation:
The above revisions reflect the latest updates to the ASME standards that are referenced in Table 1701.1 and Table 1701.2.

Committee Action: Accept as Submitted

Total Eligible to Vote: 26

Voting Results: Affirmative: 25  Not Returned: 1  Daniels

Appended Comments

Public Comment 1

Code Year: 2024 UPC  Section #: Table 1701.1, Table 1701.2  Item #: 327

Submitter: Angel Guzman  ASME  Comment #: 1

Recommendation:

Revise text

Request to accept the code change proposal as modified by this public comment.
### TABLE 1701.1
**REFERENCED STANDARDS**

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<td>Personal Hygiene Devices for Water Closets Fixtures</td>
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<td>Flexible Water Connectors Piping</td>
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<td>Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 Fittings</td>
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<td>Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Fittings</td>
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<td>Rules for Construction of Pressure Vessels - Division 1 Miscellaneous</td>
<td>505.4, 1309.5(2), 1310.4(2), 1312.3(2)</td>
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<td>ASME BPVC Section IX-2019-2021</td>
<td>Welding, Brazing, and Fusing Qualifications - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators Miscellaneous</td>
<td>1322.1.1, 1322.2.1, 1323.11</td>
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(portions of table not shown remain unchanged)

**Note:** The ASME standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

### TABLE 1701.2
**STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

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<td>Rules for Construction of Heating Boilers</td>
<td>Miscellaneous</td>
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</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The above revisions reflect the latest updates to the ASME standards that are referenced in Table 1701.1 and Table 1701.2.
**Proposals**

**Item #: 329**

**UPC 2024** Section: Table 1701.1, Table 1701.2

**SUBMITTER:** Terry Burger  
ASSE

**RECOMMENDATION:** Revise text

### TABLE 1701.1
**REFERENCE STANDARDS**

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<th>REFERENCED SECTION</th>
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<td>Anti-Siphon Fill Valves for Water Closet Tanks</td>
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<td>Water Pressure Reducing Valves for Domestic-Potable Water Distribution Systems</td>
<td>Valves</td>
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<td>ASSE 1008-2006-2020</td>
<td>Plumbing Aspects of Residential Food Waste Disposer Units</td>
<td>Appliances</td>
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<td>Pressure Vacuum Breaker Assembly Assemblies</td>
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<td>Trap Seal Primer - Drainage Types and Electric Design Types</td>
<td>DWV Components</td>
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<td>Dual Check Valve Type Backflow Preventers for Carbonated Beverage Dispensers, Post Mix Type</td>
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<td>Backflow Preventers with Integral Pressure Reducing Boiler Feed Valve and Intermediate Atmospheric Vent Style for Domestic and Light Commercial Water Distribution Systems</td>
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(portions of table not shown remain unchanged)

**Note:** The ASSE standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.
COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Table 1701.1, Table 1701.2  Item #: 329

SUBMITTER: Terry Burger  ASSE

RECOMMENDATION:
Revise text

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

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<td>ASSE 1003-2020</td>
<td>Water Pressure Reducing Valves for Potable Water Distribution Systems</td>
<td>Valves</td>
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<td>Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventer Prevention Assemblies</td>
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<td>Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies</td>
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<td>ASSE 1024-2017</td>
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<td>Outdoor Enclosures for Fluid Conveying Components with Errata dated February 1, 2019</td>
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<td>Installers of Residential Potable Water Fire Sprinkler Systems for One- and Two-Family Dwellings</td>
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</table>

Note: The ASSE standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.
SUBSTANTIATION:
The above revisions reflect the latest updates to the ASSE standards that are referenced in Table 1701.1 and Table 1701.2.
Proposals

Item #: 330
UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: Steve Mawn
ASTM

RECOMMENDATION:
Revise text

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<tr>
<td>ASTM A53/A53M-2018</td>
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<td>Piping</td>
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<td>Piping</td>
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<td>ASTM A403/A403M-2018a-2020</td>
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**TABLE 1701.2**  
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

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<td>ASTM A479/A479M-2018-2020</td>
<td>Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels</td>
<td>Piping, Ferrous</td>
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<td>Refined Lead</td>
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<td>ASTM B370-2012 (R2019)</td>
<td>Copper Sheet and Strip for Building Construction</td>
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<td>ASTM C14-2015a-2020</td>
<td>Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe</td>
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<td>ASTM C443-2012 (R2017)-2020</td>
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<td>ASTM C1227-2019-2020</td>
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<td>ASTM D2774-2012-2020</td>
<td>Underground Installation of Thermoplastic Pressure Piping</td>
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<tr>
<td>ASTM D2855-2015-2020</td>
<td>The Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets</td>
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<td>ASTM F1924-2014-2019</td>
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<td>Fabricated Fittings of Butt-Fused Polyethylene (PE)</td>
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Note: The ASTM standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.
ASTM F2306/F2306M-2018 to 2020
12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications

(portions of table not shown remains unchanged)

SUBSTANTIATION:
The above revisions reflect the latest updates to the ASTM standards that are referenced in Table 1701.1 and Table 1701.2.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

The TCC has the responsibility to resolve conflicts and achieve correlation among the recommendations of the Technical Committee. The TCC has the authority to choose between alternative text recommended by the Technical Committee, but only as necessary for correlation, consistency, and the correction of errors and omissions in accordance with Section 3-4 of the Regulations Governing Committee Projects.

Actions taken on UPC Item # 330, Table 1701.1 (Referenced Standards) and UPC Table 604.1 (Materials for Building Supply and Water Distribution Piping and Fittings) resulted in conflicting language within the code. In order to correlate the language, the Technical Correlating Committee proposed the following modifications to the UPC:

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<th>MATERIAL</th>
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<th>WATER DISTRIBUTION PIPE AND FITTINGS</th>
<th>REFERENCED STANDARD(S) PIPE</th>
<th>REFERENCED STANDARD(S) FITTINGS</th>
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<td>X</td>
<td>ASTM-F1986</td>
<td>ASTM-F1986</td>
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</table>

(portions of table not shown remain unchanged)

TCC ACTION: ACCEPT AS SUBMITTED

TCC STATEMENT:
The reference to ASTM F1986 standard in UPC Table 604.1 (Materials for Building Supply and Water Distribution Piping and Fittings) is being stricken to correlate with the action taken by the UPC TC for Item # 330, Table 1701.1 (Referenced Standards) as the ASTM F1986 standard has been withdrawn by the promulgator.

The action moves forward as approved by the TCC and supersedes the recommendation from the UPC TC for actions taken for Table 604.1 regarding the ASTM F1986 standard that has been withdrawn by the promulgator.

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: Table 1701.1, Table 1701.2 Item #: 330

SUBMITTER: Steve Mawn American Society of Testing and Materials (ASTM)

RECOMMENDATION:
Revise text

Request to accept the code change proposal as modified by this public comment.
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<td>ASTM A554-2016</td>
<td><strong>Standard Specification for</strong> Welded Stainless Steel Mechanical Tubing</td>
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<td>Piping</td>
<td>1208.5.4, 1208.5.10.2</td>
</tr>
<tr>
<td>ASTM F3226/F3226M-2019</td>
<td>Standard Specification for Metallic Press-Connect Fittings for Piping and Tubing Systems</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: The ASTM standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.
<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
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<tbody>
<tr>
<td>ASTM A377-2018</td>
<td>Standard Index of Specifications for Ductile Iron Pressure Pipe</td>
<td>Piping, Ferrous</td>
</tr>
<tr>
<td>ASTM A479/A479M-2020</td>
<td>Standard Specification for Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels</td>
<td>Piping, Ferrous</td>
</tr>
<tr>
<td>ASTM A733-2016</td>
<td>Standard Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples</td>
<td>Piping, Ferrous</td>
</tr>
<tr>
<td>ASTM C14-2020</td>
<td>Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe</td>
<td>Piping, Non-Metallic</td>
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<tr>
<td>ASTM C444-2047 2021</td>
<td>Standard Specification for Perforated Concrete Pipe</td>
<td>Piping, Non-Metallic</td>
</tr>
<tr>
<td>ASTM C1227-2020</td>
<td>Standard Specification for Precast Concrete Septic Tanks</td>
<td>DWV Components</td>
</tr>
<tr>
<td>ASTM D1784-2020</td>
<td>Standard Classification System and Basis for Specifications for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds</td>
<td>Piping, Plastic</td>
</tr>
<tr>
<td>ASTM D2774-2020 2021a</td>
<td>Standard Practice for Underground Installation of Thermoplastic Pressure Piping</td>
<td>Piping, Plastic</td>
</tr>
<tr>
<td>ASTM D2855-2020</td>
<td>Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets</td>
<td>Joints</td>
</tr>
<tr>
<td>ASTM F402-2018</td>
<td>Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings</td>
<td>Joints</td>
</tr>
<tr>
<td>ASTM F480-2014</td>
<td><strong>Standard Specification for</strong> Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80</td>
<td>Piping, Plastic</td>
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<tr>
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<tr>
<td>ASTM F1216-2016-2021</td>
<td><strong>Standard Practice for</strong> Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube</td>
<td>Piping</td>
</tr>
<tr>
<td>ASTM F1743-2017</td>
<td><strong>Standard Practice for</strong> Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)</td>
<td>Piping, Plastic</td>
</tr>
<tr>
<td>ASTM F1924-2019</td>
<td><strong>Standard Specification for</strong> Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing</td>
<td>Fittings</td>
</tr>
<tr>
<td>ASTM F1948-2020</td>
<td><strong>Standard Specification for</strong> Metallic Mechanical Fittings for Use on Outside Diameter Controlled Thermoplastic Gas Distribution Pipe and Tubing</td>
<td>Fittings</td>
</tr>
<tr>
<td>ASTM F2165-2019</td>
<td><strong>Standard Specification for</strong> Flexible Pre-Insulated Piping</td>
<td>Piping, Plastic</td>
</tr>
<tr>
<td>ASTM F2206-2019</td>
<td><strong>Standard Specification for</strong> Fabricated Fittings of Butt-Fused Polyethylene (PE)</td>
<td>DWV Components</td>
</tr>
<tr>
<td>ASTM F2306/F2306M-2020-2021</td>
<td><strong>Standard Specification for</strong> 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications</td>
<td>Piping, Plastic</td>
</tr>
<tr>
<td>ASTM F2561-2020</td>
<td><strong>Standard Practice for</strong> Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One-Piece Main and Lateral Cured-in-Place Liner</td>
<td>Piping</td>
</tr>
<tr>
<td>ASTM F2599-2020</td>
<td><strong>Standard Practice for</strong> Sectional Repair of Damaged Pipe by Means of an Inverted Cured-In-Place Liner</td>
<td>Piping</td>
</tr>
<tr>
<td>ASTM F3240-2019e1</td>
<td><strong>Standard Practice for</strong> Installation of Seamless Molded Hydrophilic Gaskets (SMHG) for Long-Term Water-tightness of Cured-in-Place Rehabilitation of Main and Lateral Pipelines</td>
<td>Piping</td>
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(portions of table not shown remain unchanged)

**SUBSTANTIATION:**

The above revisions reflect the latest updates to the ASTM standards that are referenced in Table 1701.1 and Table 1701.2.
Proposals

Item #: 332
UPC 2024  Section: Table 1701.1

SUBMITTER: Paul Olson
AWWA

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWWA C153-2014-2019</td>
<td>Ductile-Iron Compact Fittings</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>AWWA C500-2009-2019</td>
<td>Metal-Seated Gate Valves for Water Supply Service</td>
<td>Valves</td>
<td>606.1</td>
</tr>
<tr>
<td>AWWA C507-2018-2018</td>
<td>Ball Valves, 6 in. through 60 in. (150 mm through 1,500 mm)</td>
<td>Valves</td>
<td>606.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: AWWA C153, AWWA C500, and AWWA C507 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
The above revisions reflect the latest updates to the AWWA standards that are referenced in Table 1701.1.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Table 1701.1, Table 1701.2   Item #: 332

SUBMITTER: Paul Olson
AWWA

RECOMMENDATION:
Revise text

Request to accept the code change proposal as modified by this public comment.
### TABLE 1701.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
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<tbody>
<tr>
<td>AWWA C901-2017 2020</td>
<td>Polyethylene (PE) Pressure Pipe and Tubing, 3/4 in. (19 mm) through 3 in. (76 mm), for Water Service</td>
<td>Piping</td>
<td>Table 604.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**Note:** AWWA C901 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

### TABLE 1701.2
**STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
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</thead>
<tbody>
<tr>
<td>AWWA C203-2015 2020</td>
<td>Coal-Tar Protective Coatings and Linings for Steel Water Pipe</td>
<td>Miscellaneous</td>
</tr>
</tbody>
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(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The above revisions reflect the latest updates to the AWWA standards that are referenced in Table 1701.1 and Table 1701.2.
Proposals

Item #: 333
UPC 2024 Section: Table 1701.1, Table 1701.2

SUBMITTER: Tom Deary
CGA (Compressed Gas Association)

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
<th>REFERENCED STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD NUMBER</td>
<td>STANDARD TITLE</td>
</tr>
<tr>
<td>CGA V-5-2008 (R2013)-2019</td>
<td>Diameter Index Safety System (Noninterchangeable Low Pressure Connections for Medical Gas Applications)</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: CGA G-4.1 and CGA V-5 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

<table>
<thead>
<tr>
<th>TABLE 1701.2</th>
<th>STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOCUMENT NUMBER</td>
<td>Document Title</td>
</tr>
<tr>
<td>CGA C-9-2013-2019</td>
<td>Standard Color Marking of Compressed Gas Containers for Medical Use</td>
</tr>
<tr>
<td>CGA S-1.3-2008-2020</td>
<td>Pressure Relief Device Standards-Part 3-Stationary Storage Containers for Compressed Gases</td>
</tr>
<tr>
<td>CGA V-1-2013-2019</td>
<td>Compressed Gas Cylinder Valve Outlet and Inlet Connections</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
The above revisions reflect the latest updates to the CGA standards that are referenced in Table 1701.1 and Table 1701.2.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Table 1701.2  Item #: 333

SUBMITTER: Tom Deary  Comment #: 1
CGA

RECOMMENDATION:
Revise text

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

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
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<tbody>
<tr>
<td>CGA V-1-2049-2021</td>
<td>Compressed Gas Cylinder Valve Outlet and Inlet Connections</td>
<td>Valves</td>
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</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
The above revisions reflect the latest updates to the CGA standards that are referenced in Table 1701.2.
Proposals

Item #: 334

UPC 2024 Section: Table 1701.1

SUBMITTER: David Parney
CISPI

RECOMMENDATION:
Revise text

### TABLE 1701.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>CISPI 301-2017-2018</td>
<td>Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications</td>
<td>Piping, Ferrous</td>
<td>301.2.4, Table 701.2, Table 707.2</td>
</tr>
<tr>
<td>CISPI 310-2017-2020</td>
<td>Couplings for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications</td>
<td>Joints</td>
<td>301.2.4, 705.2.2</td>
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</table>

(portions of table not shown remains unchanged)

Note: CISPI 301 and CISPI 310 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
The above revisions reflect the latest updates to the CISPI standards that are referenced in Table 1701.1.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

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**APPENDED COMMENTS**

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: Table 1701.1

SUBMITTER: David Parney
CISPI

RECOMMENDATION:
Revise text

Request to accept the code change proposal as modified by this public comment.
<table>
<thead>
<tr>
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<th>REFERENCED SECTION</th>
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<tbody>
<tr>
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<td>Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications</td>
<td>Piping, Ferrous</td>
<td>301.2.4, Table 701.2, Table 707.2</td>
</tr>
</tbody>
</table>

( порции табліци не показані залишаються не зміненими)

**Note:** CISPI 301 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

**SUBSTANTIATION:**
The above revision reflects the latest update to the CISPI standard that is referenced in Table 1701.1.
Proposals

Item #: 335

UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: Lauro Pilla / Nikki Kidd
CSA

RECOMMENDATION:
Revise text

### TABLE 1701.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASME A112.4.2-2015,(R2020)/CSA B45.16-2015,(R2020)</td>
<td>Personal Hygiene Devices for Water Closets</td>
<td>Fixtures</td>
<td>411.4</td>
</tr>
<tr>
<td>ASSE 1002-2020/ASME A112.1002-2020/CSA B125.12-2015-2020</td>
<td>Anti-Siphon Fill Valves for Water Closet Tanks</td>
<td>Backflow Protection</td>
<td>413.3, Table 603.2</td>
</tr>
<tr>
<td>ASSE 1037-20152020/ASME A112.1037-20152020/CSA B125.37-20142020</td>
<td>Pressurized Flushing Devices for Plumbing Fixtures</td>
<td>Backflow Protection</td>
<td>413.2</td>
</tr>
<tr>
<td>CSA B137.1-2017-2020</td>
<td>Polyethylene (PE) Pipe, Tubing, and Fittings for Cold-Water Pressure Services</td>
<td>Piping</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>CSA B137.5-2017-2020</td>
<td>Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications</td>
<td>Piping</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>CSA B137.6-2017-2020</td>
<td>Chlorinated Polyvinylchloride (CPVC) Pipe, Tubing, and Fittings for Hot- and Cold-Water Distribution Systems</td>
<td>Piping, Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>CSA B137.9-2017-2020</td>
<td>Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure-Pipe Systems</td>
<td>Piping</td>
<td>Table 604.1</td>
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<tr>
<td>CSA B137.10-2017-2020</td>
<td>Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Composite Pressure-Pipe Systems</td>
<td>Piping</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>CSA B137.11-2017-2020</td>
<td>Polypropylene (PP-R &amp; PP-RCT) Pipe and Fittings for Pressure Applications</td>
<td>Piping</td>
<td>Table 604.1, 605.11.1</td>
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<tr>
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<td>APPLICATION</td>
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<tr>
<td>CSA A257 Series-2014-2019</td>
<td>Standards for Concrete Pipe and Manhole Sections</td>
<td>Piping</td>
<td></td>
</tr>
<tr>
<td>CSA B55.2-2015 (R2019)</td>
<td>Drain Water Heat Recovery Units</td>
<td>Miscellaneous</td>
<td></td>
</tr>
<tr>
<td>CAN/CSA G401-2014 (R2019)</td>
<td>Corrugated Steel Pipe Products</td>
<td>Piping, Ferrous</td>
<td></td>
</tr>
<tr>
<td>CAN/CSA G401-2014 (R2019)</td>
<td>Corrugated Steel Pipe Products</td>
<td>Piping, Ferrous</td>
<td></td>
</tr>
<tr>
<td>CSA/ANSI Z21.10.3-2018/CSA 4.3-2019</td>
<td>Gas-Fired Water Heaters, Volume III, Storage Water Heaters with Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous (same as CSA 4.3)</td>
<td>Fuel Gas, Appliances</td>
<td></td>
</tr>
<tr>
<td>CSA/ANSI Z21.54-2014/CSA 8.4-2019</td>
<td>Gas Hose Connectors for Portable Outdoor Gas-Fired Appliances (same as CSA 8.4)</td>
<td>Fuel Gas</td>
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</tr>
<tr>
<td>CSA/ANSI Z21.80a-2012/CSA 6.22-2019</td>
<td>Line Pressure Regulators (same as CSA 6.22a)</td>
<td>Fuel Gas</td>
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</table>

(portions of table not shown remains unchanged)

**Note:** The CSA standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.
SUBSTANTIATION:
The above revisions reflect the latest updates to the CSA standards that are referenced in Table 1701.1 and Table 1701.2.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:

AFFIRMATIVE: 25

NOT RETURNED: 1 Daniels

Public Comment

Code Year: 2024 UPC  Section #: Table 1701.1, Table 1701.2  Item #: 335

SUBMITTER: Lauro Pilla / Nikki Kidd  Comment #: 1

CSA

RECOMMENDATION:
Revise text

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

TABLE 1701.1 REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
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<tbody>
<tr>
<td>CSA B45.11-2017/IAPMO Z401-2017 (R2021)</td>
<td>Glass Plumbing Fixtures</td>
<td>Fixtures</td>
<td>407.1</td>
</tr>
<tr>
<td>ASME A112.4.2-2015/2021/CSA B45.16-2015 (R2020)-2021</td>
<td>Personal Hygiene Devices for Water Closets</td>
<td>Fixtures</td>
<td>411.4</td>
</tr>
<tr>
<td>CSA B64.1.1-2011 (R2016)-2021</td>
<td>Atmospheric Vacuum Breakers (AVB)</td>
<td>Backflow Protection</td>
<td>Table 603.2</td>
</tr>
<tr>
<td>CSA B64.1.2-2011 (R2016)-2021</td>
<td>Pressure Vacuum Breakers (PVB)</td>
<td>Backflow Protection</td>
<td>Table 603.2</td>
</tr>
<tr>
<td>CSA B64.2.1.1-2011 (R2016)-2021</td>
<td>Hose Connection Dual Check Vacuum Breakers (HCDVB)</td>
<td>Backflow Protection</td>
<td>Table 603.2</td>
</tr>
<tr>
<td>CSA B64.4-2011 (R2016)-2021</td>
<td>Reduced Pressure Principle (RP) Backflow Preventers</td>
<td>Backflow Protection</td>
<td>Table 603.2</td>
</tr>
<tr>
<td>CSA B64.4.1-2011 (R2016)-2021</td>
<td>Reduced Pressure Principle Backflow Preventers for Fire Protection Systems (RPF)</td>
<td>Backflow Protection</td>
<td>Table 603.2</td>
</tr>
<tr>
<td>CSA B64.5-2011 (R2016)-2021</td>
<td>Double Check Valve (DCVA) Backflow Preventers</td>
<td>Backflow Protection</td>
<td>Table 603.2</td>
</tr>
<tr>
<td>CSA B64.5.1-2011 (R2016)-2021</td>
<td>Double Check Valve Backflow Preventers for Fire Protection Systems (DCVAF)</td>
<td>Backflow Protection</td>
<td>Table 603.2</td>
</tr>
<tr>
<td>CSA B125.5-2011/IAPMO Z600-2011 (R2016)</td>
<td>Flexible Water Connectors with Excess Flow Shut-off Device</td>
<td>Miscellaneous</td>
<td>604.5</td>
</tr>
<tr>
<td>CSA B137.6-2020</td>
<td>Chlorinated Polyvinylchloride (CPVC) Pipe, Tubing, and Fittings for Hot- and Cold-Water Distribution Systems (with Update No. 1)</td>
<td>Piping, Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>CSA B181.3-2018/2021</td>
<td>Polyolefin and Polyvinylidene Fluoride (PVDF) Laboratory Drainage Systems</td>
<td>Piping</td>
<td>811.2</td>
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(portions of table not shown remain unchanged)

**Note:** The CSA standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

### TABLE 1701.2
**STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
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<tbody>
<tr>
<td>CSA B55.2-2015 (R2019)-2020</td>
<td>Drain Water Heat Recovery Units</td>
<td>Miscellaneous</td>
</tr>
<tr>
<td>CSA B64.7-2011 (R2016)-2021</td>
<td>Laboratory Faucet Vacuum Breakers (LFVB)</td>
<td>Backflow Protection</td>
</tr>
<tr>
<td>CSA B66-2016-2021</td>
<td>Design, Material, and Manufacturing Requirements for Prefabricated Septic Tanks and Sewage Holding Tanks</td>
<td>DWV Components</td>
</tr>
<tr>
<td>CSA-ANSI Z83.11-2016 (R2021)/CSA 1.8-2016 (R2021)</td>
<td>Gas Food Service Equipment <em>(same as CSA 1.8)</em></td>
<td>Fuel Gas, Appliances</td>
</tr>
<tr>
<td>CSA Z317.1-2016</td>
<td>Special Requirements for Plumbing Installations in Health Care Facilities</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The above revisions reflect the latest updates to the CSA standards that are referenced in Table 1701.1 and Table 1701.2.
Proposals

Item #: 336
UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: Robert Pickering  
EPA

RECOMMENDATION:  
Revise text

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
<th>REFERENCED STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD NUMBER</td>
<td>STANDARD TITLE</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: EPA/600/R-12/618 does not meet the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

<table>
<thead>
<tr>
<th>TABLE 1701.2</th>
<th>STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOCUMENT NUMBER</td>
<td>DOCUMENT TITLE</td>
</tr>
<tr>
<td>EPA/600/R-12/618-2012</td>
<td>Guidelines for Water Reuse</td>
</tr>
<tr>
<td>EPA WaterSense-2015</td>
<td>Specification for Flushometer-Valve Water Closets</td>
</tr>
<tr>
<td>EPA WaterSense-2018</td>
<td>Specification for Showerheads</td>
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</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:  
The above revisions reflect the latest updates to the EPA standards that are referenced in Table 1701.1 and Table 1701.2.

Both of the WaterSense standard specifications added to Table 1701.2 are mentioned in Appendix L of the UPC, but their associated reference in Table 1701.2 does not exist. The WaterSense Specification for Flushometer-Valve Water Closets is mentioned in L 402.2.2. The WaterSense Specification for Showerheads is mentioned in L 402.6.

COMMITTEE ACTION: ACCEPT AS AMENDED BY THE TC
Amend proposal as follows:

### TABLE 1701.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA/600/R-12/618-2012</td>
<td>Guidelines for Water Reuse</td>
<td>Miscellaneous</td>
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(portions of table not shown remains unchanged)

### TABLE 1701.2
**STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
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<tbody>
<tr>
<td>EPA WaterSense-2015</td>
<td>Specification for Flushometer-Valve Water Closets</td>
<td>Fixtures</td>
</tr>
<tr>
<td>EPA WaterSense-2018</td>
<td>Specification for Showerheads</td>
<td>Fixtures</td>
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</tbody>
</table>

(ports of table not shown remains unchanged)

**COMMITTEE STATEMENT:**
Based on previous actions, the EPA standard was removed from Table 1701.1. The remaining changes were approved.

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** 25  **AFFIRMATIVE:** 25  **NOT RETURNED:** 1  Daniels

---

**Appended Comments**

---

**PUBLIC COMMENT 1**

**Code Year:** 2024  **UPC Section #:** Table 1701.2  **Item #:** 336

**SUBMITTER:** Robert Pickering

Environmental Protection Agency (EPA)

**RECOMMENDATION:**
Revise text

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

### TABLE 1701.2
**STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
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<tbody>
<tr>
<td>EPA WaterSense-2014-2021</td>
<td>Specification for Weather-Based Irrigation Controllers</td>
<td>Irrigation</td>
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**SUBSTANTIATION:**
The above revision reflects the latest update to the EPA standard that is referenced in Table 1701.2.
Proposals

Item #: 337

UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: Kyle Thompson
IAPMO

RECOMMENDATION:
Revise text

TABLE 1701.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<tr>
<td>IAPMO IGC 78-2018-2019</td>
<td>Drain, Waste and Vent (DWV) Internal Cleanout Fittings</td>
<td>DWV Components</td>
<td>Table 707.2</td>
</tr>
<tr>
<td>IAPMO IGC 349-2018</td>
<td>Electronic Plumbing Supply System Integrity Protection Devices</td>
<td>Miscellaneous</td>
<td>606.9</td>
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<td>IAPMO IGC 352-2018-2020</td>
<td>Diverter Valves for Diversion of Rainwater or Storm Water for Use in Alternate Nonpotable Water Source Systems</td>
<td>Valves</td>
<td>1503.2.4</td>
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<td>IAPMO PS 65-2002-2019</td>
<td>Airgap Units for Water Conditioning Equipment Installation</td>
<td>Backflow Protection</td>
<td>611.2</td>
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<td>IAPMO PS 117-2017-2019</td>
<td>Press and Nail Connections</td>
<td>Fittings</td>
<td>Table 604.1</td>
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<td>IAPMO Z124.5-2013(R2018)</td>
<td>Plastic Toilet Seats</td>
<td>Appurtenance</td>
<td>411.3</td>
</tr>
<tr>
<td>IAPMO Z1033-2015(R2020)</td>
<td>Flexible PVC Hoses and Tubing for Pools, Hot Tubs, Spas, and Jetted Bathtubs</td>
<td>Tubing</td>
<td>409.6.1</td>
</tr>
<tr>
<td>IAPMO Z1088-2013-2019(R2019)</td>
<td>Pre-Pressurized Water Expansion Tanks</td>
<td>Miscellaneous</td>
<td>608.3</td>
</tr>
<tr>
<td>IAPMO Z1157-2014(R2019)</td>
<td>Ball Valves</td>
<td>Valves</td>
<td>606.1</td>
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</table>

(portions of table not shown remains unchanged)

Note: The IAPMO standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.
<table>
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<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
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<td>IAPMO IGC 109-2017 2019</td>
<td>Water Distribution Manifolds</td>
<td>Valves</td>
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<td>IAPMO IGC 193-2010 2020</td>
<td>Safety Plates, Plate Straps, Notched Plates and Safety Collars</td>
<td>Miscellaneous</td>
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<tr>
<td>IAPMO IGC 226-2006a 2019</td>
<td>Drinking Water Fountains Without or Without Chiller or Heater</td>
<td>Fixtures</td>
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<tr>
<td>IAPMO IGC 276-2014 2019</td>
<td>Bundled Expanded Polystyrene (EPS), Synthetic Aggregate Units</td>
<td>DWV Components</td>
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<tr>
<td>IAPMO IGC 330-2017 2018</td>
<td>Recirculating Shower Systems</td>
<td>Fixtures</td>
</tr>
<tr>
<td>IAPMO PS 1-2007 2019</td>
<td>Tank Risers</td>
<td>DWV Components</td>
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<td>IAPMO PS 23-2006a 2019</td>
<td>Dishwasher Drain Airgaps</td>
<td>Backflow Protection</td>
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<tr>
<td>IAPMO PS 25-2002-2019</td>
<td>Metallic Fittings for Joining Polyethylene Pipe for Water Service and Yard Piping</td>
<td>Joints</td>
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<tr>
<td>IAPMO PS 34-2003-2019</td>
<td>Encasement Sleeves for Potable Water Pipe and Tubing</td>
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<td>IAPMO PS 37-2000-2019</td>
<td>Black Plastic PVC or PE Pressure-Sensitive Corrosion Preventive Tape</td>
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<tr>
<td>IAPMO PS 50-2010-2019</td>
<td>Flush Valves with Dual Flush Device for Water Closets or Water Closet Tanks with Integral Flush Valves with a Dual Flush Device</td>
<td>Fixtures</td>
</tr>
<tr>
<td>IAPMO PS 52-2009a 2019</td>
<td>Pump/Dose, Sumps and Sewage Ejector Tanks with or without a Pump</td>
<td>DWV Components</td>
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<td>IAPMO PS 53-2016a 2020</td>
<td>Grooved Mechanical Pipe Couplings and Grooved Fittings</td>
<td>Joints</td>
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<td>IAPMO PS 57-2002</td>
<td>PVC Hydraulically Actuated Diaphragm-Type Water Control Valves (WITHDRAWN)</td>
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<td>IAPMO PS 63-2014-2019</td>
<td>Plastic Leaching Chambers</td>
<td>DWV Components</td>
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<td>IAPMO PS 67-2010-2019</td>
<td>Early-Closure Replacement Flappers or Early-Closure Replacement Flapper with Mechanical Assemblies</td>
<td>Fixtures</td>
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<td>IAPMO PS 69-2006-2019</td>
<td>Bathwaste and Overflow Assemblies with Tub Filler Spout</td>
<td>DWV Components</td>
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<td>IAPMO PS 72-2007e 2019</td>
<td>Valves with Atmospheric Vacuum Breakers</td>
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<td>IAPMO PS 79-2006-2019</td>
<td>Multiport Electronic Trap Primers</td>
<td>DWV Components</td>
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<td>IAPMO PS 80-2008-2019</td>
<td>Clarifiers</td>
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<td>IAPMO PS 81-2006-2019</td>
<td>Precast Concrete Seepage Pit Liners and Covers</td>
<td>DWV Components</td>
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<td>Fiberglass (Glass Fiber Reinforced Thermosetting Resin) Fittings (WITHDRAWN)</td>
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<td>IAPMO PS 85-1996-2019</td>
<td>Tools for Mechanically Formed Tee Connections in Copper Tubing</td>
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<td>IAPMO PS 86-1996-2019</td>
<td>Rainwater Diverter Valves for Non-Roofed Area Slabs</td>
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<td>IAPMO PS 89-1995</td>
<td>Soaking and Hydrotherapy (Whirlpool) Bathtubs with Hydraulic Seatlift (WITHDRAWN)</td>
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<td>IAPMO PS 95-2018 2019</td>
<td>Pipe Support Hangers and Hooks</td>
<td>DWV Components</td>
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<td>IAPMO PS 99-1996</td>
<td>Prefabricated Fiberglass Church Baptisteries (WITHDRAWN)</td>
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<td>Poreus Filter Protector for Sub-Drain Weep Holes (WITHDRAWN)</td>
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<td>IAPMO PS 101-1997 2019</td>
<td>Suction Relief Valves</td>
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<td>Item #: IAPMO PS 104-1997 2019</td>
<td>Pressure Relief Connection for Dispensing Equipment Valves</td>
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<td>Polyethylene-Distribution Boxes (WITHDRAWN) DWV Components</td>
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<td>PVC Cold Water Compression Fittings Fittings</td>
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<td>Item #: IAPMO PS 111-1999 2019</td>
<td>PVC Cold Water Gripper Fittings Fittings</td>
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<td>Item #: IAPMO PS 113-2010</td>
<td>Hydraulically Powered Household Food-Waste-Disposers Appliances</td>
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<td>Item #: IAPMO PS 114-1999b1</td>
<td>Remote Floor-Box Industrial Water Supply, Air Supply, Drainage (WITHDRAWN) Miscellaneous</td>
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<td>Item #: IAPMO PS 115-2007 2019</td>
<td>Hot Water On-Demand or Automatic Activated Hot Water Pumping Systems Miscellaneous</td>
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<td>Item #: IAPMO PS 116-1999</td>
<td>Hot Water Circulating Devices Which Do Not Use a Pump (WITHDRAWN) Miscellaneous</td>
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<tr>
<td>Item #: IAPMO Z124.7-2013(R2018)</td>
<td>Prefabricated Plastic Spa Shells Fixtures, Swimming Pools, Spas, and Hot Tubs</td>
<td></td>
</tr>
<tr>
<td>Item #: IAPMO Z124.8-2013(R2018)</td>
<td>Plastic Liners for Bathtubs and Shower Receptors Fixtures</td>
<td></td>
</tr>
<tr>
<td>Item #: IAPMO Z1000-2013-2019</td>
<td>Prefabricated Septic Tanks DWV Components</td>
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</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
The above revisions reflect the latest updates to the IAPMO standards that are referenced in Table 1701.1 and Table 1701.2.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS: AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Table 1701.1, Table 1701.2  Item #: 337

SUBMITTER: Terry Burger  IAPMO  Comment #: 1

RECOMMENDATION:

Revise text

Request to accept the code change proposal as modified by this public comment.
### TABLE 1701.1
**REFERENCED STANDARDS**

<table>
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<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<tr>
<td>ANSI/CAN/ASSE/IAPMO 1055-2020</td>
<td>Chemical Dispensers with Integral Backflow Protection</td>
<td>Backflow Protection</td>
<td>Table 603.2, 603.5.21</td>
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<tr>
<td>IAPMO IGC 352-2020</td>
<td>Diverter Valves for use in Alternate Nonpotable Water Source Systems</td>
<td>Valves</td>
<td>1603.20</td>
</tr>
<tr>
<td>IAPMO PS 59-2016a e1 e2</td>
<td>Wastewater Diverter/Bypass Valves and Diversion Systems</td>
<td>Fittings</td>
<td>1503.2.2, 1603.20</td>
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<td>Trap Primers for Fill Valves and Flushometer Valves</td>
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</tr>
<tr>
<td>IAPMO PS 117-2014 2021</td>
<td>Press Connections</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>IAPMO/ANSI Z124.5-2013 R2018</td>
<td>Plastic Toilet Seats</td>
<td>Appurtenance</td>
<td>411.3</td>
</tr>
<tr>
<td>CSA B45.11-2017/IAPMO Z401-2017 (R2021)</td>
<td>Glass Plumbing Fixtures</td>
<td>Fixtures</td>
<td>407.1</td>
</tr>
<tr>
<td>IAPMO/ANSI Z601-2018</td>
<td>Scale Reduction Devices</td>
<td>Water Conditioning, Water Treatment</td>
<td>611.1.2</td>
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<tr>
<td>ANSI/CAN/IAPMO Z1001-2016-2021</td>
<td>Prefabricated Gravity Grease Interceptors</td>
<td>Fixtures</td>
<td>1014.1, 1014.3.4</td>
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<tr>
<td>IAPMO/ANSI Z1002-2020</td>
<td>Rainwater Harvesting Tanks</td>
<td>Rainwater Tanks</td>
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</tr>
<tr>
<td>IAPMO/ANSI Z1033-2015 (R2020)</td>
<td>Flexible PVC Hoses and Tubing for Pools, Hot Tubs, Spas, and Jetted Bathtubs</td>
<td>Tubing</td>
<td>409.6.2</td>
</tr>
<tr>
<td>IAPMO/ANSI Z1088-2019 e1</td>
<td>Pre-Pressurized Water Expansion Tanks</td>
<td>Miscellaneous</td>
<td>608.3</td>
</tr>
<tr>
<td>IAPMO/ANSI Z1157-2014e1 (R2019)</td>
<td>Ball Valves</td>
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<tr>
<td>ANSI/CAN/IAPMO Z1349-2021</td>
<td>Devices for Detection, Monitoring or Control of Plumbing Systems</td>
<td>Leak Detection</td>
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</table>

(portions of table not shown remain unchanged)

**Note:** The IAPMO standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

### TABLE 1701.2
**STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

<table>
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<tbody>
<tr>
<td>ASSE/IAPMO/ANSI 12080-2020-2021</td>
<td>Professional Qualifications Standard for Legionella Water Safety and Management Specialist</td>
<td>Professional Qualifications</td>
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<tr>
<td>ASSE/IAPMO/ANSI Series 16000-2019</td>
<td>Professional Qualifications Standard for Inspectors and Plans Examiners</td>
<td>Professional Qualifications</td>
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<tr>
<td>IAPMO IGC 344-2045a-2021</td>
<td>Tub and Shower Flow-Reduction Systems</td>
<td>Valves</td>
</tr>
<tr>
<td>IAPMO PS 23-2049 2021</td>
<td>Dishwasher Drain Airgaps</td>
<td>Backflow Protection</td>
</tr>
<tr>
<td>IAPMO PS 51-2016 2021</td>
<td>Expansion Joints and Flexible Expansion Joints for DWV Piping Systems</td>
<td>Joints</td>
</tr>
<tr>
<td>------------------------</td>
<td>---------------------------------------------------------------------</td>
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</tr>
<tr>
<td>IAPMO PS 52-2019 2021</td>
<td>Pump/Dose, Sumps and Sewage Ejector Tanks with or without a Pump</td>
<td>DWV Components</td>
</tr>
<tr>
<td>IAPMO PS 54-2015 2021a</td>
<td>Metallic and Plastic Utility Boxes</td>
<td>Miscellaneous</td>
</tr>
<tr>
<td>IAPMO/ANSI Z124.7-2013(R2018)</td>
<td>Prefabricated Plastic Spa Shells</td>
<td>Fixtures, Swimming Pools, Spas, and Hot Tubs</td>
</tr>
<tr>
<td>IAPMO/ANSI Z124.8-2013e2(R2018)</td>
<td>Plastic Liners for Bathtubs and Shower Receptors</td>
<td>Fixtures</td>
</tr>
<tr>
<td>IAPMO/ANSI Z1000-2019</td>
<td>Prefabricated Septic Tanks</td>
<td>DWV Components</td>
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</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The above revisions reflect the latest updates to the IAPMO standards that are referenced in Table 1701.1 and Table 1701.2.
Item #: 339
UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: Alex Ing  
NFPA

RECOMMENDATION:  
Revise text

### TABLE 1701.1  
REFERENCED STANDARDS

<table>
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<tr>
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<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<tbody>
<tr>
<td>NFPA 31-2016-2020</td>
<td>Installation of Oil-Burning Equipment</td>
<td>Fuel Gas, Appliances</td>
<td>505.3, 1201.1</td>
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<tr>
<td>NFPA 58-2017-2020</td>
<td>Liquefied Petroleum Gas Code</td>
<td>Fuel Gas</td>
<td>1208.5(7), 1208.6.7.3, 1208.6.11.4, 1212.11</td>
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<tr>
<td>NFPA 70-2017-2020</td>
<td>National Electrical Code</td>
<td>Miscellaneous</td>
<td>1210.12.5(2), 1211.2.4, 1211.7, 1317.1(11), 1323.3.1</td>
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<td>NFPA 99-2018-2021</td>
<td>Health Care Facilities Code</td>
<td>Miscellaneous</td>
<td>1301.3, 1309.13(2), 1317.1(9), 1324.5.9.4, 1327.1</td>
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<td>NFPA 780-2017-2020</td>
<td>Installation of Lightning Protection Systems</td>
<td>Fuel Gas</td>
<td>1211.5</td>
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(portions of table not shown remains unchanged)

Note: NFPA standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

### TABLE 1701.2  
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

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(portions of table not shown remains unchanged)

SUBSTANTIATION:  
The above revisions reflect the latest updates to the NFPA standards that are referenced in Table 1701.1 and Table 1701.2.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:  AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels
PUBLIC COMMENT 1

Code Year: 2024 UPC  Section #: Table 1701.1, Table 1701.2  
Item #: 339
SUBMITTER: Alex Ing  
National Fire Protection Association (NFPA)

RECOMMENDATION:

Revise text

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

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
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<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<tbody>
<tr>
<td>NFPA 13D-2019-2022</td>
<td>Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes</td>
<td>Miscellaneous</td>
<td>612.1, 612.5.3.1</td>
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<td>NFPA 31-2020</td>
<td>Standard for the Installation of Oil-Burning Equipment</td>
<td>Fuel Gas, Appliances</td>
<td>505.3, 1201.1</td>
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<tr>
<td>NFPA 211-2019</td>
<td>Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances</td>
<td>Fuel Gas, Appliances</td>
<td>509.5.2, 509.5.3, 509.5.6.1, 509.5.6.3</td>
</tr>
<tr>
<td>NFPA 409-2016-2022</td>
<td>Standard on Aircraft Hangars</td>
<td>Miscellaneous</td>
<td>507.15</td>
</tr>
<tr>
<td>NFPA 780-2020</td>
<td>Standard for the Installation of Lightning Protection Systems</td>
<td>Fuel Gas</td>
<td>1211.5</td>
</tr>
<tr>
<td>NFPA 1192-2018-2021</td>
<td>Standard on Recreational Vehicles</td>
<td>Fuel Gas</td>
<td>1202.3(18)</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: The NFPA standards meet the requirements for mandatory reference standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:

Several NFPA standards were revised since the last edition of the UPC and we request updates to reflect the current editions years. Additionally, please note the correct full titles of the listed NFPA standards and codes.
### TABLE 1701.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF/ANSI 3-2017-2019</td>
<td>Commercial Warewashing Equipment</td>
<td>Appliances</td>
<td>414.1</td>
</tr>
<tr>
<td>NSF/ANSI 14-2018-2020</td>
<td>Plastics Piping System Components and Related Materials</td>
<td>Miscellaneous</td>
<td>301.2.3, 604.1</td>
</tr>
<tr>
<td>NSF/ANSI 42-2018-2019</td>
<td>Drinking Water Treatment Units – Aesthetic Effects</td>
<td>Appliances</td>
<td>Table 611.1</td>
</tr>
<tr>
<td>NSF/ANSI 44-2018</td>
<td>Residential Cation Exchange Water Softeners</td>
<td>Appliances</td>
<td>Table 611.1</td>
</tr>
<tr>
<td>NSF/ANSI 53-2017-2019</td>
<td>Drinking Water Treatment Units - Health Effects</td>
<td>Appliances</td>
<td>Table 611.1</td>
</tr>
<tr>
<td>NSF/ANSI 55-2018-2019</td>
<td>Ultraviolet Microbiological Water Treatment Systems</td>
<td>Appliances</td>
<td>Table 611.1</td>
</tr>
<tr>
<td>NSF/ANSI 58-2017-2019</td>
<td>Reverse Osmosis Drinking Water Treatment Systems</td>
<td>Appliances</td>
<td>611.2, Table 611.1</td>
</tr>
<tr>
<td>NSF/ANSI 62-2018-2020</td>
<td>Drinking Water Distillation Systems</td>
<td>Appliances</td>
<td>Table 611.1</td>
</tr>
<tr>
<td>NSF/ANSI 350-2018</td>
<td>Valves for Crosslinked Polyethylene (PEX)</td>
<td>Valves</td>
<td>606.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: NSF standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.
### TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
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</thead>
<tbody>
<tr>
<td>NSF/ANSI 2-2018</td>
<td>Food Equipment</td>
<td>Appliances</td>
</tr>
<tr>
<td>NSF/ANSI 4-2016</td>
<td>Commercial Cooking, Rethermalization, and Powered Hot Food Holding and Transportation Equipment</td>
<td>Appliances</td>
</tr>
<tr>
<td>NSF/ANSI 5-2016</td>
<td>Water Heaters, Hot Water Supply Boilers, and Heat Recovery Equipment</td>
<td>Appliances</td>
</tr>
<tr>
<td>NSF/ANSI 12-2018</td>
<td>Automatic Ice Making Equipment</td>
<td>Appliances</td>
</tr>
<tr>
<td>NSF/ANSI 18-2016</td>
<td>Manual Food and Beverage Dispensing Equipment</td>
<td>Appliances</td>
</tr>
<tr>
<td>NSF/ANSI 29-2017</td>
<td>Detergent and Chemical Feeders for Commercial Spray-Type Dishwashing Machines</td>
<td>Appliances</td>
</tr>
<tr>
<td>NSF/ANSI 40-2016</td>
<td>Residential Wastewater Treatment Systems</td>
<td>DWV Components</td>
</tr>
<tr>
<td>NSF/ANSI 41-2016</td>
<td>Non-Liquid Saturated Treatment Systems</td>
<td>DWV Components</td>
</tr>
<tr>
<td>NSF/ANSI 46-2016</td>
<td>Evaluation of Components and Devices Used in Wastewater Treatment Systems</td>
<td>DWV Components</td>
</tr>
<tr>
<td>NSF/ANSI 169-2016</td>
<td>Special Purpose Food Equipment and Devices</td>
<td>Appliances</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

**SUBSTANTIATION:**
The above revisions reflect the latest updates to the NSF standards that are referenced in Table 1701.1 and Table 1701.2.

**COMMITTEE ACTION:** ACCEPT AS SUBMITTED

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

---

### Appended Comments

---

### PUBLIC COMMENT 1

**Code Year:** 2024  **UPC**  **Section #:** Table 1701.1, Table 1701.2  **Item #:** 340

**SUBMITTER:** Jeremy Brown  
NSF

**RECOMMENDATION:**
Revise text

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

---

### TABLE 1701.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF/ANSI 3-2019</td>
<td>Commercial Warewashing Equipment</td>
<td>Appliances</td>
<td>414.1</td>
</tr>
<tr>
<td>NSF/ANSI 42-2019</td>
<td>Drinking Water Treatment Units - Aesthetic Effects</td>
<td>Appliances</td>
<td>Table 611.1</td>
</tr>
<tr>
<td>NSF/ANSI 53-2019</td>
<td>Drinking Water Treatment Units - Health Effects</td>
<td>Appliances</td>
<td>Table 611.1</td>
</tr>
<tr>
<td>NSF/ANSI 55-2019</td>
<td>Ultraviolet Microbiological Water Treatment Systems</td>
<td>Appliances</td>
<td>Table 611.1</td>
</tr>
<tr>
<td>NSF/ANSI 58-2019</td>
<td>Reverse Osmosis Drinking Water Treatment Systems</td>
<td>Appliances</td>
<td>611.2, Table 611.1</td>
</tr>
<tr>
<td>DOCUMENT NUMBER</td>
<td>DOCUMENT TITLE</td>
<td>APPLICATION</td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------------------------</td>
<td>-----------------------</td>
<td></td>
</tr>
<tr>
<td>NSF/ANSI 4-2019 2020</td>
<td>Commercial Cooking, Rethermalization, and Powered Hot Food Holding and Transportation Equipment</td>
<td>Appliances</td>
<td></td>
</tr>
<tr>
<td>NSF/ANSI 18-2016 2020</td>
<td>Manual Food and Beverage Dispensing Equipment</td>
<td>Appliances</td>
<td></td>
</tr>
<tr>
<td>NSF/ANSI 29-2017 2021</td>
<td>Detergent and Chemical Feeders for Commercial Spray-Type Dishwashing Machines</td>
<td>Appliances</td>
<td></td>
</tr>
<tr>
<td>NSF/ANSI 40-2019 2020</td>
<td>Residential Wastewater Treatment Systems</td>
<td>DWV Components</td>
<td></td>
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<tr>
<td>NSF/ANSI 46-2020 2021</td>
<td>Evaluation of Components and Devices Used in Wastewater Treatment Systems</td>
<td>DWV Components</td>
<td></td>
</tr>
<tr>
<td>NSF/ANSI/CAN 60-2020 2021</td>
<td>Drinking Water Treatment Chemicals - Health Effects</td>
<td>Water Treatment</td>
<td></td>
</tr>
<tr>
<td>NSF/ANSI 169-2016 2020</td>
<td>Special Purpose Food Equipment and Devices</td>
<td>Appliances</td>
<td></td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The above revisions reflect the latest updates to the NSF standards that are referenced in Table 1701.1 and Table 1701.2.
Proposals

Item #: 341
UPC 2024  Section: Table 1701.1

SUBMITTER: Max Weiss
Plumbing and Drainage Institute (PDI)

RECOMMENDATION:
Revise text

| TABLE 1701.1
<table>
<thead>
<tr>
<th>REFERENCED STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD NUMBER</td>
</tr>
<tr>
<td>PDI G-102-2010</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: PDI G-102 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
The PDI G-102 standard is being modified to reflect the correct edition in Table 1701.1

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26
VOTING RESULTS: AFFIRMATIVE: 25  NOT RETURNED: 1  Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024  UPC  Section #: Table 1701.2  Item #: 341
SUBMITTER: Veronica Crosier
PSAI  Comment #: 1

RECOMMENDATION:
Revise text

Request to accept the code change proposal as modified by this public comment.
<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The above revision reflects the latest update to the PSAI standard that is referenced in Table 1701.2.

---

**PUBLIC COMMENT 2**

**Code Year:** 2024 **UPC Section #:** Table 1701.2  
**SUBMITTER:** Katelyn Simpson  
**TCNA**  
**Comment #:** 2

**RECOMMENDATION:**
Revise text

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

**TABLE 1701.2**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCNA A118.10-2014 (R2019)</td>
<td>Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**SUBSTANTIATION:**
The above revision reflects the latest update to the TCNA standards that are referenced in Table 1701.2.
Proposals

Item #: 342

UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: John Taecker
UL LLC

RECOMMENDATION:
Revise text

### TABLE 1701.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 174-2004</td>
<td>Household Electric Storage Tank Water Heaters (with revisions through December 15, 2016-September 15, 2020)</td>
<td>Appliances</td>
<td>Table 501.1(1)</td>
</tr>
<tr>
<td>UL 399-2017</td>
<td>Drinking Water Coolers (with revisions through August 29, 2018-July 31, 2020)</td>
<td>Fixtures</td>
<td>415.1</td>
</tr>
<tr>
<td>UL 441-2016</td>
<td>Gas Vents (with revisions through July 27, 2016-August 28, 2019)</td>
<td>Fuel Gas, Vents</td>
<td>509.1</td>
</tr>
<tr>
<td>UL 467-2013</td>
<td>Grounding and Bonding Equipment (with revisions through June 7, 2017)</td>
<td>Miscellaneous</td>
<td>1211.2.5</td>
</tr>
<tr>
<td>UL 651-2011</td>
<td>Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings (with revisions through June 16, 2016-March 24, 2020)</td>
<td>Piping</td>
<td>1208.6.6</td>
</tr>
<tr>
<td>UL 778-2016</td>
<td>Motor-Operated Water Pumps (with revisions through January 17, 2019-August 11, 2020)</td>
<td>Appliances</td>
<td>1101.14</td>
</tr>
<tr>
<td>UL 921-2016</td>
<td>Commercial Dishwashers (with revisions through September 26, 2017)</td>
<td>Appliances</td>
<td>414.1</td>
</tr>
<tr>
<td>UL 959-2010</td>
<td>Medium Heat Appliance Factory-Built Chimneys (with revisions through June 12, 2014-August 28, 2019)</td>
<td>Fuel Gas, Appliances</td>
<td>509.5.1</td>
</tr>
<tr>
<td>UL 1738-2010</td>
<td>Venting Systems for Gas-Burning Appliances, Categories II, III, and IV (with revisions through November 7, 2014-February 6, 2020)</td>
<td>Fuel Gas, Appliances</td>
<td>509.4.1, 509.4.2, 509.4.3</td>
</tr>
<tr>
<td>UL 1777-2015</td>
<td>Chimney Liners (with revisions through April 11, 2019)</td>
<td>Chimney Liners</td>
<td>509.5.3(2)</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: The UL standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.
### TABLE 1701.2
**STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 80-2007</td>
<td>Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids (with revisions through January 16, 2014-April 26, 2019)</td>
<td>Fuel Gas</td>
</tr>
<tr>
<td>UL 144-2012</td>
<td>LP-Gas Regulators (with revisions through November 5, 2014-December 10, 2019)</td>
<td>Fuel Gas</td>
</tr>
<tr>
<td>UL 296-2017</td>
<td>Oil Burners (with revisions through November 29, 2017-January 8, 2021)</td>
<td>Fuel Gas, Appliances</td>
</tr>
<tr>
<td>UL 429-2013</td>
<td>Electrically Operated Valves (with revisions through January 16, 2020)</td>
<td>Valves</td>
</tr>
<tr>
<td>UL 536-2014</td>
<td>Flexible Metallic Hose (with revisions through December 10, 2019)</td>
<td>Fuel Gas</td>
</tr>
<tr>
<td>UL 563-2009</td>
<td>Ice Makers (with revisions through August 30, 2018-July 23, 2020)</td>
<td>Appliances</td>
</tr>
<tr>
<td>UL 1331-2005</td>
<td>Station Inlets and Outlets (with revisions through May 12, 2017-February 5, 2020)</td>
<td>Medical Gas</td>
</tr>
<tr>
<td>UL 2157-2018</td>
<td>Electric Clothes Washing Machines and Extractors (with revisions through September 20, 2019)</td>
<td>Appliances</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

**SUBSTANTIATION:**
The above revisions reflect the latest updates to the UL standards that are referenced in Table 1701.1 and Table 1701.2.

**COMMITTEE ACTION:** ACCEPT AS SUBMITTED

**TOTAL ELIGIBLE TO VOTE:** 26

**VOTING RESULTS:** AFFIRMATIVE: 25 NOT RETURNED: 1 Daniels

### Appended Comments

**PUBLIC COMMENT 1**

**Code Year:** 2024 UPC  **Section #:** Table 1701.1, Table 1701.2  **Item #:** 342

**SUBMITTER:** John Taecker  **Comment #:** 1

**UL LLC**

**RECOMMENDATION:**
Revise text

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

### TABLE 1701.1
**REFERENCED STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL-17-2008</td>
<td>Vent or Chimney Connector Dampers for Oil-Fired Appliances (with revisions through September 25, 2013) WITHDRAWN</td>
<td>Fuel Gas, Vent Dampers</td>
<td>509.14.1</td>
</tr>
<tr>
<td>UL 103-2010</td>
<td>Factory-Built Chimneys for Residential Type and Building Heating Appliances (with revisions through March 15, 2017-September 24, 2021)</td>
<td>Fuel Gas, Appliances</td>
<td>509.5.1, 509.5.1.1</td>
</tr>
</tbody>
</table>
### TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 174-2004</td>
<td>Household Electric Storage Tank Water Heaters (with revisions through September 15, 2020 December 16, 2021)</td>
<td>Appliances</td>
</tr>
<tr>
<td>UL 430-2015</td>
<td>Waste Disposers (with revisions through February 23, 2018 September 14, 2021)</td>
<td>Appliances</td>
</tr>
<tr>
<td>UL 499-2014</td>
<td>Electric Heating Appliances (with revisions through February 23, 2017 October 22, 2021)</td>
<td>Appliances</td>
</tr>
<tr>
<td>UL 778-2016</td>
<td>Motor-Operated Water Pumps (with revisions through August 11, 2020 June 29, 2021)</td>
<td>Appliances</td>
</tr>
<tr>
<td>UL 1479-2015</td>
<td>Fire Tests of Penetration Firestops (with revisions through May 18, 2021)</td>
<td>Miscellaneous</td>
</tr>
<tr>
<td>UL 1738-2010</td>
<td>Venting Systems for Gas-Burning Appliances, Categories II, III, and IV (with revisions through February 6, 2020 August 26, 2021)</td>
<td>Fuel Gas, Appliances</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**Note:** The UL standards meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
The above revisions reflect the latest updates to the UL standards that are referenced in Table 1701.1 and Table 1701.2.
Proposals

Item #: 343
UPC 2024 Section: Table 1701.2

SUBMITTER: Emily Toto
ASHRAE

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
</table>

(subparts of the table not shown remain unchanged)

SUBSTANTIATION:
The above revisions reflect the latest updates to the ASHRAE standards that are referenced in Table 1701.2.

COMMITTEE ACTION: ACCEPT AS SUBMITTED

TOTAL ELIGIBLE TO VOTE: 26

VOTING RESULTS:
AFFIRMATIVE: 25
NOT RETURNED: 1 Daniels

Appended Comments

PUBLIC COMMENT 1

Code Year: 2024 UPC Section #: Table 1701.2

SUBMITTER: Emily Toto
ASHRAE

RECOMMENDATION:
Revise text

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

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
</table>

(subparts of the table not shown remain unchanged)

SUBSTANTIATION:
The above revisions reflect the latest updates to the ASHRAE standards that are referenced in Table 1701.2.
Task Group Reports
UPC Condensate Task Group Report
UPC Condensate Task Group Report

Roster:

<table>
<thead>
<tr>
<th>Member</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Julius Ballanco (Chair)</td>
<td>JB Engineering and Code Consulting, P.C.</td>
</tr>
<tr>
<td>Phil Trafton</td>
<td>ASHRAE</td>
</tr>
<tr>
<td>Richard Goldsmith</td>
<td>Sunbelt Marketing, Inc.</td>
</tr>
<tr>
<td>Gary Bonetti</td>
<td>UA Local 342</td>
</tr>
<tr>
<td>Gary Duren</td>
<td>Self</td>
</tr>
<tr>
<td>David Clayson</td>
<td>Wavin Limited</td>
</tr>
<tr>
<td>Trevor Meyer</td>
<td>UA Local 582</td>
</tr>
</tbody>
</table>

Overview:

During the May 3-7, 2021 virtual Technical Committee Meetings, the UPC TC Interim Chair, Julius Ballanco, approved the formation of a UPC Condensate Task Group to address exposure risk to the public from multiple condensate drain lines interconnected through a common drain to provide guidance to assist in the control and intervention of health and safety concerns associated with airborne contaminants from condensate discharge from building mechanical systems and equipment between building spaces.

The scope of the Condensate Task Group is to evaluate provisions related to condensate discharge, drainage interconnections through a common drain, indirect connections, condensate traps, and protection of trap seals. Additionally, the task group will review the allowance for interconnecting condensate discharge between dwelling units and/or tenant spaces, to address any potential issues with biological aerosols passing through the condensate drainage systems. The recommendations provided by the task group will be forwarded to the UPC and UMC Technical Committees as a public comment for consideration in the development of the 2024 editions of the UPC and UMC.

The Task Group met three times via teleconference on October 5, 2021; October 25, 2021; and November 22, 2021. Proposed recommendations were obtained from members of the task group and any interested parties.

The Task Group generated recommendations to UPC Section 814.4 (Appliance Condensate Drains) and Section 814.5 (Point of Discharge) based on UPC Proposal Item # 212 with several modifications to address concerns regarding health and safety and enforceable code language. The Task Group generated recommendations as follows:
814.0 Condensate Waste and Control.

814.4 Appliance Condensate Drains. Condensate drain lines from individual condensing appliances shall be sized as required by the manufacturer’s instructions. Condensate drain lines serving more than one appliance shall be approved by the Authority Having Jurisdiction prior to installation connecting to a common indirect waste pipe shall have the connections to the indirect waste pipe protected by a sanitary waste valve complying with ASME A112.18.8, condensate trap complying with IAPMO IGC 196, or trap with a trap primer.

814.5 Point of Discharge. Air-conditioning condensate waste pipes shall connect indirectly to the drainage system through an air gap or air break to trapped and vented receptors, dry wells, mop sinks, or leach pits. An individual condensate drain shall be trapped in accordance with the appliance manufacturer’s instructions or as approved in accordance with Section 814.4.

Exception: Direct connections in accordance with Section 814.6.

---

TABLE 1701.1

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
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<tbody>
<tr>
<td>ASME A112.18.8-2020</td>
<td>Sanitary Waste Valves for Plumbing Drainage Systems</td>
<td>Sanitary Waste Valves</td>
<td>814.4</td>
</tr>
<tr>
<td>IAPMO IGC 196-2018</td>
<td>Condensate Traps and Overflow Switches for Air-Conditioning Systems</td>
<td>Condensate Traps</td>
<td>814.4</td>
</tr>
</tbody>
</table>

(portion of table not shown remain unchanged)

SUBSTANTIATION:
The primary concern with the connection to indirect waste pipe from multiple condensate drains is the free passage of air between spaces. Without a means of preventing the movement of air in the indirect waste pipe, biohazardous airborne materials can easily migrate between building spaces. This can result in a medical emergency from exposure to viruses, germs, or chemicals emanating into a space.

Since the connection of the condensate is indirect, there are no hard piping connections that closes off the piping between different building spaces. There needs to be a means or mechanism that isolates the open piping while still allowing the pipe to serve as an indirect waste pipe. This mechanism would prevent the movement of contaminated air between different spaces in a building. Two currently available devices that would provide the isolation of air movement through an indirect waste pipe are sanitary waste valves and condensate traps. These devices are regulated by ASME A112.18.8 and IAPMO IGC 196 respectively. Both devices will isolate the air movement and are proven by testing and listing to the referenced standards.

To a lesser degree, a water seal trap could provide isolation of air movement. The problem with a trap is that if the trap loses the water seal, the trap provides no protection against air movement. Condensate drains may not operate for months, thus leaving the trap with no source of water for refilling due to
evaporation. For that reason, the only possible means of accepting a water seal trap as an alternative to the two devices is to mandate a trap seal primer valve. While the alternative of a trap with trap seal primer is included in the acceptable means of protection from air movement, it is the poorest of the three methods identified.

This public comment is a life safety issue in protecting the public from transmission of airborne contaminants between building spaces. This concern has become more apparent with the current pandemic facing the world. It is imperative that the Plumbing Code and Mechanical Code address the issue with means of preventing a hazardous situation.

The UMC/UPC Condensate Task Group was appointed by the Chairs of the Plumbing Technical Committee and Mechanical Technical Committee. The Task Group met numerous times to develop this public comment.
UPC Indoor Horticulture Facilities Task Group Report
UPC Indoor Horticulture Facilities Task Group Report

Roster:

<table>
<thead>
<tr>
<th>Member</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gary Bonetti (Chair)</td>
<td>UA Local 342</td>
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<tr>
<td>Cary Smith</td>
<td>Sound Geothermal Corp.</td>
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<tr>
<td>Phil Ribbs</td>
<td>PHR Consultants</td>
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<tr>
<td>Kevin Sullivan</td>
<td>UA Local 342</td>
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<tr>
<td>Misty Guard</td>
<td>Regulosity LLC</td>
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<tr>
<td>Trevor Meyer</td>
<td>UA Local 582</td>
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</tbody>
</table>

Overview:

During the May 3-7, 2021 virtual Technical Committee Meetings, the UPC TC Interim Chair, Julius Ballanco, approved the formation of a UPC Indoor Horticulture Facilities Task Group to further refine and develop "indoor horticulture facilities" in UPC proposal Item # 044 to determine applicability and accuracy of requirements for such facilities.

The scope of the Uniform Plumbing Code (UPC) Indoor Horticulture Facilities Task Group is to review and develop recommendations on UPC Item No. 044 to determine applicability and accuracy of requirements for such facilities. The recommendations provided by the task group will be forwarded to the UPC Technical Committee as a public comment for consideration in the development of the 2024 edition of the UPC.

The Task Group met four times via teleconference on September 14, 2021; October 13, 2021; November 8, 2021; and December 7, 2021. Proposed recommendations were obtained from members of the task group and interested parties.

The Task Group generated recommendations are based on UPC Proposal Item # 044 with several modifications to address the concerns of the committee regarding health and safety and enforceability of the code. The Task Group proposed the following recommendations for the UPC Technical Committees consideration:
APPENDIX T
INDOOR CANNABIS AND HORTICULTURE FACILITIES

T 101.0 Indoor Cannabis and Horticulture Facilities.
T 101.1 General. Plumbing for indoor horticulture facilities spaces, including cannabis facilities, shall be in accordance with this code. This appendix shall apply to primary and secondary horticulture facilities indoor horticulture within new and existing buildings.

T 201.0 Definitions.
T 201.1 General. For the purpose of this appendix, the following definitions shall apply:
Agricultural Water. Water used in indoor horticulture activities where water is intended to contact plants.
Cultivation Room. A room of any size where plants are grown under controlled conditions. Also known as a grow room.
Fertigation. The process of injecting nutrients into the irrigation water.
Horticulture Cannabis Facility. A business, facility, or establishment where retail Cannabis indoor horticulture is grown, cultivated, tested, stored, dried, extracted, weighed, packaged, sold, or processed, including dispensaries, cultivators, manufacturers, distributors, or testing laboratories.
Indoor Horticulture. The cultivation and processing of floricultural and horticultural plants, including cannabis, in an indoor space by controlling various interior environmental variables including, but not limited to, temperature, air quality, humidity, artificial lighting, nutrients, and carbon dioxide.
Indoor Horticulture Water Distribution Systems. A system to supply water from its primary source to its point of use, including but not limited to pipes, sprinklers, irrigation equipment, pumps, valves, storage tanks, meters, and fittings.
Nutrient. Substances, chemicals, or ingredients used to promote growth, provide energy, and/or sustain plants.
Plant. A multicellular organism having cellulose cell walls intended for human consumption, ingestion, inhalation, or topical application.
Primary Horticulture Facility. A facility devoted to the growing and/or harvesting of plants. Cultivation rooms are located within these facilities.
Secondary Horticulture Facility. A facility devoted to harvesting (such as hulling or shelling), packing, and/or holding of plants.

T 301.0 Classification of Facilities.
T 301.1 General. Facilities used for indoor horticultural cultivation and processing shall be in accordance with the applicable codes as mandated by the Authority Having Jurisdiction.
T 301.2 Approved Locations. Facilities used for indoor horticultural cultivation and processing shall be located in accordance with the building code and the Authority Having Jurisdiction.

T 401.0 Documentation.
T 401.1 General. Documentation for permitting shall be provided in accordance with the requirements of Section 104.0 and the Authority Having Jurisdiction. The documentation shall show compliance with this section and other requirements in accordance with the Authority Having Jurisdiction.

T 501.0-501.0 Requirements General.
T 501.1 Mechanical Systems. Indoor horticulture mechanical systems shall be in accordance with the Mechanical Code.
T 501.2 Fire Suppression Systems. Fire suppression systems shall be in accordance with the building code and fire code.

T 403.3 501.3 Emergency Eyewash and Shower Equipment Stations. Emergency shower and eyewash stations shall be required in accordance with Section 416.2 416.0.

T 601.0 Water Supply.
T 601.1 General. Indoor horticulture water distribution systems shall be supplied with potable water in accordance with Chapter 6.
T 601.2 Materials. Pipe, tube, and fitting materials in contact with potable water, drinking water, or both shall be in accordance with Section 604.0.
T 403.1 601.3 Protection Horticulture Facilities Water Supply. Potable water lines supplying water piping used for irrigation purposes shall be equipped with an approved backflow prevention device or assembly provided with back-flow preventers to protect the domestic water supply from contamination in accordance with Table 603.2.
T 403.4 601.4 Alternate Water Supply. Where permitted, agricultural water may be used or alternate water sources in accordance with Appendix K, recycled and reclaimed water shall be permitted to be used for indoor horticulture in accordance with Chapter 15 or Chapter 16. Water tanks used for fertigation shall be listed for chemical use. Tanks stored in exterior of shall not be clear or translucent to prevent algae growth.

T 701.0 Storage Tanks.
T 701.1 Construction. Where storage tanks are used, they shall be approved by the Authority Having Jurisdiction. Potable water storage tanks shall comply with Section 607.0. Rainwater catchment storage tanks shall comply with Appendix K or in accordance with the Authority Having Jurisdiction.
Fertigation and Irrigation Equipment. Nutrient water tanks and irrigation equipment shall be installed in accordance with the manufacturer’s instructions. When connected to the potable water supply, tanks and irrigation equipment shall be located downstream of water storage tank and be protected by an approved backflow device or method in accordance with Table 603.4. Potable water to nonpotable water connections shall be protected by an air gap or a reduced zone pressure (RZP) backflow device.

Materials and Construction. The piping, components, and devices shall be compatible with the additives or nutrients used. Above grade storage tanks shall be of an opaque material, approved for aboveground use in direct sunlight, or shall be shielded from direct sunlight.

Sanitary Drainage and Indirect Wastes. Sanitary drainage shall be in accordance with Chapter 7. Indirect wastes shall be in accordance with Chapter 8. The drainage system shall be compatible with the discharge liquid waste.

Hazardous Materials. Hazardous materials shall not be discharged into the sanitary sewer, storm drain, or on the ground.

Agricultural Water Waste. Agricultural water shall be discharged in accordance with the local, state, and federal regulations as approved by the Authority Having Jurisdiction. Where agricultural water discharges to the outdoors, and is not connected to the sanitary sewer, the piping shall be installed as to restrict rodents or vermin from entering the building.

Floor Drains, Floor Sinks, and Receptors. Wastewater shall discharge into an approved receptor. Receptors shall be compatible with the wastewater and installed in accordance with this code. Fertigation water shall discharge through floor drains or other approved receptors receiving the waste from grow tables. Drains shall be trapped and vented in accordance with Chapter 10.

Exception: Class 1, Division 1 (C1/D1) rooms shall not contain floor drains.

Nonpotable Water Tank. Nonpotable water storage tanks used for irrigation shall be in accordance with Chapter 15 or Chapter 16.

Plant Storage Areas. Where drains are provided in spaces where plants are stored, such drains shall be installed with indirect waste piping. Each indirect waste pipe from plant storage areas shall be separately piped to the indirect waste receptor and shall not combine with other indirect waste pipes.

Facilities. Toilet facilities shall be provided in accordance with the Occupancy Type.
**T 1001.2 Location.** Toilet facilities shall be located in such a manner to prevent contamination of plants during harvesting, holding, manufacturing/processing, and packing.

**SUBSTANTIATION:**
The Task Group was formed during the last UPC TC meeting as the TC believed these were important provisions for the UPC and needed refinement and further expansion.

The number one focus of the task group is to protect the health and safety of the public. Each of the original proposed categories from UPC proposal Item #044 were discussed in depth and expanded. The Task Group agreed with the TC recommendation to place these provisions in an appendix and agreed that the term “cannabis” should be removed as it may be applicable to other forms of indoor horticulture facilities.

The task group believed it was important to identify the different categories of “horticulture facilities” as they exist in current federal laws. This will minimize confusion and make the language standard throughout the industry.

This UPC Task Group communicated with the UMC Indoor Horticulture Facilities Task Group to harmonize text where applicable to both codes. Some members were on both the UPC and UMC committees.

The new provisions in Section T 301.0 (Classification of Facilities) will guide the end user in determining what is acceptable in their jurisdictions whether it be from the building code, fire code, or any other enforcement body. Additionally, Section T 401.0 (Documentation) was added to guide the user to the appropriate sections for requesting permits.

Section T 901.4.1 (Plant Storage Areas) is being added as floor drains located in plant storage areas are required to drain to the drainage system by means of indirect drainage. This ensures that if there is backflow in the system, it will not enter the plant storage area and contaminate the plant.

Section T 1001.0 (Facilities) was added to ensure that these facilities are identified with an occupancy type in accordance the local jurisdiction.

The Task Group spent many hours researching and identifying water sources permitted for indoor horticulture facilities and added the appropriate language and provisions to protect the potable water supply. The language pertaining to water sources was based on research of existing sources such as technical research documents, standards, local laws, and Federal Regulation. The result was text that will unify with existing laws and regulations.

In summary, the UPC Indoor Horticulture Facilities Task Group has captured important minimum requirements that do not conflict with Federal Regulations and will ensure that local laws and guidelines are followed for the protection of the public.