2021

UPC® TECHNICAL COMMITTEE MEETING MONOGRAPH

VIRTUAL MEETING | MAY 3 – 7, 2021
TABLE OF CONTENTS

I  Tentative Agenda

II  Tentative Order of Discussion

III  Uniform Plumbing Code Change Proposals
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 (Via Teleconference on April 8, 2020)
VII. Review Code Change Proposals
VIII. Other business
IX. Next scheduled meeting (May 2 - May 5, 2022)
X. Adjournment
The following is the tentative order of discussion on which the proposed changes will be discussed at the Technical Committee Meeting. Proposed code changes that are grouped together are those that are both indented and separated by lines. Indented proposed code changes are those being discussed out of numerical order.
Item # 314
Item # 315
Item # 316
Item # 317
Item # 318
Item # 319
Item # 320
Item # 321
Item # 322
Item # 323
Item # 324
Item # 325
  Item # 326
  Item # 327
  Item # 328
  Item # 329
  Item # 330
  Item # 331
  Item # 332
  Item # 333
  Item # 334
  Item # 335
  Item # 337
  Item # 338
  Item # 339
  Item # 340
  Item # 341
  Item # 342
  Item # 343
  Item # 336
Item # 344
Item # 345
Item # 346
Item # 347
Proposals

Item #: 001
UPC 2024  Section: 103.2

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

103.0 Duties and Powers of the Authority Having Jurisdiction.

103.2 Liability. The Authority Having Jurisdiction charged with the enforcement of this code, acting in good faith and without malice in the discharge of the Authority Having Jurisdiction’s duties, shall not thereby be rendered personally liable for damage that accrues to persons or property as a result of an act or by reason of an act or omission in the discharge of duties. A suit brought against the Authority Having Jurisdiction or employee because of such act or omission performed in the enforcement of provisions of this code shall be defended by legal counsel provided by this jurisdiction until final termination of such proceedings. When the Authority Having Jurisdiction has not acted in good faith or has acted with malice, such jurisdiction shall be rendered liable.

SUBSTANTIATION:
While the AHJ has the authority to enforce this code, it does not allow a free reign to approve unauthorized, prohibited, hazardous, or otherwise unsafe systems to be installed. The AHJ or person(s) making such decisions should be held liable, including their jurisdictions. AHJs are government or private entities that have the force of law behind them. The AHJ may be a federal, state, local, or other regional department or individual such as a building official, fire chief, fire marshal, labor department, health department, or others having statutory authority.
Proposals

Item #: 002

UPC 2024 Section: 104.3.1

SUBMITTER: Adam Segura
Self

RECOMMENDATION:
Revise text

104.0 Permits.

104.3 Application for Permit. (remaining text unchanged)
104.3.1 Construction Documents. Construction documents, engineering calculations, diagrams, and other data shall be submitted in two or more sets, or in a digital format where permitted by the Authority Having Jurisdiction, with each application for a permit. The construction documents, computations, and specifications shall be prepared by, and the plumbing designed by, a registered design professional. Construction documents shall be drawn to scale with clarity to identify that the intended work to be performed is in accordance with the code.

Exception: The Authority Having Jurisdiction shall be permitted to waive the submission of construction documents, calculations, or other data where the Authority Having Jurisdiction finds that the nature of the work applied for is such that reviewing of construction documents is not necessary to obtain compliance with the code.

SUBSTANTIATION:
While paper documentation is still used in the field, digital versions of documentation is also permitted by jurisdictions. The addition of this language will eliminate the paper documents from being printed where not necessary and will allow faster submission of documents where digital format is allowed and accepted.
Proposals

Item #: 003
UPC 2024  Section: 104.4.5

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

104.0 Permits.

104.4 Permit Issuance. (remaining text unchanged)

104.4.5 Suspension or Revocation. The Authority Having Jurisdiction shall be permitted to, in writing, with written notification, to suspend or revoke a permit issued under the provisions of this code where the permit is issued in error or on the basis of incorrect information supplied or in violation of other ordinance or regulation of the jurisdiction.

SUBSTANTIATION:
The phrasing of Section 104.4.5 is being revised for clarity as the language is awkwardly written.
Proposals

Item #: 004
UPC 2024  Section: 203.0

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Add new text

203.0 -A-

Anodeless Riser. An assembly of steel-cased plastic pipe used to make the transition between plastic piping installed underground and metallic piping installed aboveground. [NFPA 54:3.3.3]

SUBSTANTIATION:
The Uniform Plumbing Code does not currently have a definition of Anodeless riser. There is some confusion in the trade that a compression PE adapter to a steel riser is comparable to an anodeless riser. This definition will eliminate the misconception and correlate with the existing UMC definition.
Proposals

Item #: 005
UPC 2024  Section: 203.0

SUBMITTER: Amie 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.
Proposals

Item #: 006
UPC 2024 Section: 203.0

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Add new text

203.0 – A –

**Authorized Personnel.** Any person who is designated by the appointing authority.

SUBSTANTIATION:
A definition is being added for "Authorized Personnel" as the term is used in the UPC but is not currently defined. See Sections 1205.1, 1208.10, and F 701.2.
CHAPTER 2
DEFINITIONS

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 54:3.3.18-3.3.17]

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 54:3.3.99.3 3.3.98.3]

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).
Adjusted 205.0 (C)

Confined Space. A room or space having a volume less than 50 cubic feet per 1000 British thermal units per hour (Btu/h) (4.83 m3/kW) of the aggregate input rating of all fuel burning appliances installed in that space with limited entrance and egress that is not suitable for inhabitants and not intended for continuous human occupancy.

1603.12 Marking. Rainwater tanks shall be permanently marked with the capacity and the language: “NONPOTABLE RAINWATER.” Where openings are provided to allow a person to enter the tank, the opening shall be marked with the following language: “DANGER-CONFINED SPACE.”

SUBSTANTIATION:
The definition for “confined space” does not match the use of the term in the UPC, Section 1603.12. The term is used once in the UPC for rainwater tanks and does not have anything to do with the definition in Chapter 2. For this reason, the definition is being updated to address the intent of the term “confined space” as used in the UPC.
Proposals

Item #: 009
UPC 2024  Section: 206.0

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

206.0  - D -

Dead Leg. Section of potable water pipe which contains water that has no flow or does not circulate. Pipe lengths equal to, or greater than 1.5 times the diameter of the pipe constitutes a dead leg.

SUBSTANTIATION:
Defining the length of a dead leg will eliminate interpretation issues between the installer and AHJ.
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.
Proposals

Item #: 011
UPC 2024 Section: 206.0, 209.0

SUBMITTER: Garry Sato
Greensmart Sustainable Concepts

RECOMMENDATION:
Revise text

206.0 - D -

Diverter Valve, Gray Water Diverter Valve. A valve that directs gray water to the sanitary drainage system or a subsurface irrigation system.
Diverter Valve, On Site Treated Nonpotable Water. A key component in the collection system to control inflow and overflow in collection tanks intended for on-site treatment and direct beneficial use.
Diverter Valve, Rainwater. A key component in commercial rainwater catchment systems to control high inflow and overflow volumes in rainwater storage tanks.

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, but not limited to, wastewater from bathtubs, showers, lavatories, clothes washers, and laundry tubs. Also known as grey water, graywater, and greywater.

SUBSTANTIATION:
The intent is to define new items that fill an unmet need and to clarify their specific uses that previously did not exist in the industry with regards to water sustainability. There are now existing regulations that require certain sustainable water practices that were not mentioned in previous code editions that require greater conformity and definition.
Proposals

Item #: 012
UPC 2024 Section: 207.0, 209.0

SUBMITTER: Samantha Liu
Self

RECOMMENDATION:
Revise text

207.0 - E -

Essentially Nontoxic Transfer Fluid. Essentially nontoxic at practically nontoxic, Toxicity Rating Class 1 (reference "Clinical Toxicology of Commercial Products" by Gosselin, Smith, Hodge, & Braddock). A fluid having a Gosselin toxicity rating of 1, or is generally recognized as safe (GRAS) by the U.S. Food and Drug Administration (FDA).

209.0 - G -

GRAS. A food substance approved by FDA because it is generally recognized to be safe under the intended conditions of use. An example is propylene glycol.

SUBSTANTIATION:
This definition was added in 2003 to support the use of single wall heat exchangers based on the success of the use of Propylene Glycol as a heat exchange medium in solar hot water systems. While the use of Propylene Glycol was a huge advance from Ethelene Glycol you can note in the paragraph above, taken from the ingredients index of the "Clinical Toxicology of Commercial Products" by Gosselin, Smith, Hodge, & Braddock) that Propylene Glycol has a toxicity rating closer to 2 than 1 and even that is questioned. Reviewing the same ingredients index, a toxicity rating of 1 is rare, and relying on that document, which appears to have last been last published in 1984, seems ill advised.
Proposals

Item #: 013

UPC 2024 Section: 208.0

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

208.0 - F -

Flood-Level Rim. The top edge of a receptor or fixture from which water overflows.

(below shown for reference only)

Receptor. An approved plumbing fixture or device of such material, shape, and capacity as to adequately receive the discharge from indirect waste pipes, so constructed and located as to be readily cleaned.

Air Break. A physical separation which may be a low inlet into the indirect waste receptor from the fixture, appliance, or device indirectly connected.

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

Area Drain. A receptor designed to collect surface or storm water from an open area.

Critical Level. The critical level (C-L or C/L) marking on a backflow prevention device or vacuum breaker is a point conforming to approved standards and established by the testing laboratory (usually stamped on the device by the manufacturer) that determines the minimum elevation above the flood-level rim of the fixture or receptor served at which the device may be installed. Where a backflow prevention device does not bear a critical level marking, the bottom of the vacuum breaker, combination valve, or the bottom of such approved device shall constitute the critical level.

SUBSTANTIATION:
As currently written, the term “flood-level rims” is limited to “receptors” which seems like an oversight in the language. The term “flood-level rim” applies to water closets, urinals and other fixtures that are not considered a receptor. The simple addition of “or fixture” will clarify the intended use for flood-level rims and not just limit it to a receptor.
209.0  – G –  
Gas Piping. An installation of pipe, valves, or fittings that are used to convey fuel gas, installed on a premise or in a building, but shall not include:
(1) A portion of the service piping.
(2) An approved piping connection 6 feet (1829 mm) or less in length an existing gas outlet and a gas appliance in the same room with the outlet.

(below shown for reference only)

1202.0 Coverage of Piping System.  
1202.1 General. Coverage of piping systems shall extend from the point of delivery to the appliance connections. For other than undiluted liquefied petroleum gas (LP-Gas) systems, the point of delivery shall be the outlet of the service meter assembly or the outlet of the service regulator or service shutoff valve where no meter is provided. For undiluted LP-Gas systems, the point of delivery shall be considered to be the outlet of the final pressure regulator, exclusive of line gas regulators where no meter is installed. Where a meter is installed, the point of delivery shall be the outlet of the meter. [NFPA 54:1.1.1.1(A)]

1212.0 Appliance and Equipment Connections to Building Piping.  
1212.3.1 Indoor. Indoor gas hose connectors shall be used only to connect laboratory, shop, and ironing appliances requiring mobility during operation and installed in accordance with the following:
(1) An appliance shutoff valve shall be installed where the connector is attached to the building piping.
(2) The connector shall be of minimum length and shall not exceed 6 feet (1829 mm).
(3) The connector shall not be concealed and shall not extend from one room to another or pass through wall partitions, ceilings, or floors. [NFPA 54:9.6.2(1)]

SUBSTANTIATION:
The change is removing the term “shall” from the definition for “Gas Piping” as the IAPMO Manual of Style indicates that definitions shall not be written in mandatory language.

The language in (1) in not necessary as it is already covered under the 1202.1 (General) indicating that gas piping systems extend from the point of delivery.

The change also removes (2), the “limit of 6 feet” and “within the same room” for gas connectors as it does not belong in a definition. Furthermore, the limit of 6 feet is already addressed in Section 1212.3.1 (Indoor) for nonmetallic gas hose connectors.
Proposals

Item #: 015
UPC 2024 Section: 209.0

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Add new text

209.0 - G -

Granular Fill. A Class 1 fill that is a graded, crusher run material, which is screened and crushed.

SUBSTANTIATION:
The term “granular fill” is used in the UPC but not defined. The proposed language is common in construction sites. The additional text will provide the minimum requirements for the end user to make a decision when preparing and filling trenches for thermoplastic piping.
Proposals

Item #: 016
UPC 2024  Section: 209.0

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Add new text

209.0 – G –

**Groundwater.** Water that exists beneath the earth's surface. Originating as rainfall or snow and ice melt, the precipitation infiltrates the soil replenishing the groundwater system. The water may remain below grade in aquifers or underground streams or make its way back to the surface to feed streams, rivers or lakes.

**SUBSTANTIATION:**
The term "groundwater" is used multiple times in the Uniform Plumbing Code. A definition will clarify the intent of the applicable Code sections using the term.
Proposals

Item #: 017
UPC 2024  Section: 212.0

SUBMITTER: Donald (DJ) Berger
Self

RECOMMENDATION:
Revise text

212.0  - J -

Joint, Press-Connect Elastomeric, A permanent mechanical removable or non-removable joint incorporating an elastomeric seal or an elastomeric seal and corrosion resistant grip ring. The joint is made with a pressing tool and jaw or ring that complies with the manufacturer’s installation instructions.

SUBSTANTIATION:
The word “Press-Connect” describes one type of technology using elastomeric materials for the joint seal. By revising the definition with the word “Elastomeric.” This definition may be expanded to include similar joining technologies employing an elastomeric material for its seal. E.g., push-fit, grooved (Victaulic), bolted (Dresser), compression repair couplings, etc.

The words “permanent mechanical” are inconsistent with other “permanent” and “mechanical” joint definitions within this section of the code. By revising the definition with the removal of the phrase “The joint is made with a pressing tool and jaw or ring that complies with the manufacturer’s installation instructions,” the definition would be inclusive of similar joining technologies employing elastomeric materials. This revision would provide additional consistency within the code as the 2021 UPC has specific sections that provide information on how joints are to be made.
Proposals

Item #: 018
UPC 2024  Section: 214.0

SUBMITTER: John Taecker
UL LLC

RECOMMENDATION:
Revises text

214.0 – L –

Listed (Third Party Certified). Equipment or materials included in a list published by a listing agency (accredited conformity assessment body) that maintains periodic inspection of current production of listed equipment or materials and whose listing states either that the equipment or material complies with approved standards or has been tested and found suitable for use in a specified manner. Terms used to identify listed equipment, products, or materials include “listed,” “certified,” or other terms as determined appropriate by the listing agency.

SUBSTANTIATION:
The proposed revision to the definition for “Listed” recognizes that listing organizations may use other terms to identify “listed” equipment, products, or materials. An example of other terms used that meet the definition of “listed” include “certified.” The term “certified” is a more globally recognized term used by listing organizations compared to the term “listed.”
Proposals

Item #: 019
UPC 2024  Section: 214.0, 216.0

SUBMITTER: Phil Pettit
Control Air Conditioning Corporation
Rep. Self

RECOMMENDATION:
Add new text

214.0 – L –

**Limited-Combustible Material.**  A material with limited burning characteristics that, in the form in which it is used, has a potential for combustion and does not comply with the definition of noncombustible material.

216.0 – N –

**Noncombustible Material.**  A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.

SUBSTANTIATION:
This proposal adds the definitions for “Limited-Combustible Material” and “Noncombustible Material” for clarification as the terms are used in the UPC and are not defined. A similar proposal has been submitted to the UMC.
Proposals

Item #: 020
UPC 2024  Section: 215.0

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Add new text

215.0  – M –
Mid-Story Guide. A support designed to keep piping in alignment, located half-way between floors or a floor and ceiling.

SUBSTANTIATION:
The term is used several times in Table 313.3 but not defined in the code. This will assist the end user on the intent of such term.
Proposals

Item #: 021

UPC 2024  Section: 218.0

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Add new text

218.0  – P –

Public Use Occupancy. Commercial buildings that include, but are not limited to office buildings, retail stores, restaurants, industrial, multi-family housing, hotels, motels, arenas, stadiums, and other structures not used for one and two family dwellings.

SUBSTANTIATION:
There is no definition for the term "public use occupancy" in the Code. That term is used in Section 710.9 and Section 1101.14 of the 2021 UPC to require multiple pumps for sanitary and storm water wastes. Defining the term "public use occupancy" gives the user a clearer understanding of when two pumps would be needed.
Proposals

Item #: 022
UPC 2024  Section: 221.0

SUBMITTER: Karan Kapila
    Self

RECOMMENDATION:
    Revise text

L-201.0 Definitions. 221.0 – S –

Stormwater. Natural precipitation that has contacted a surface at grade or below grade and has not been put to beneficial use.

SUBSTANTIATION:
    This term is being relocated to Chapter 2 as it is used throughout the UPC.
Proposals

Item #: 023

UPC 2024  Section: 221.0

SUBMITTER: Bruce A Pfeiffer
           Retired - City of Topeka

RECOMMENDATION:
Revise text

L-201.0-Definitions: 221.0 – S –

Stormwater. Natural precipitation, including rain, snow, and ice melt, that discharges across land surfaces, including manmade surfaces, or through other conveyances to one or more waterways that has contacted a surface at grade or below-grade and has not been put to beneficial use.

SUBSTANTIATION:
The definition for stormwater is being updated to clarify that stormwater includes runoff water from concrete surfaces, some of which may include pollutants. This would require pretreatment of the stormwater prior to use as a non-potable water source.
Proposals

Item #: 024
UPC 2024  Section: 222.0

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Add new text

222.0 -T-  

**Thermoplastic.** A type of plastic made of polymer resins that becomes soft and pliable when heated, reverting to its original hard form when cooled. This type of plastic material is used when joining pipe and fittings utilizing heat-fusion welding methods. Thermoplastic pipe and fittings do not show chemical property changes when they are heated and cooled multiple times.

**SUBSTANTIATION:**
With thermoplastic pipe and fittings becoming more prominent in the industry, a definition is needed in the UPC to describe the properties of the material and how it is being used.
Vacuum Relief Valve. A device that automatically allows air to enter the piping system to prevent conditions that could siphon water from the system and prevent excessive vacuum in a pressure vessel.

SUBSTANTIATION:
The proposed language broadens the definition of a vacuum relief valve as used in a plumbing system. The valve is not only protecting the pressure vessel from excessive vacuum, but also preventing conditions that could siphon the water from the system and possibly cause damage to water heater and equipment.
Proposals

Item #: 026
UPC 2024  Section: 224.0

SUBMITTER: Chris Sweeny
Specification Sales

RECOMMENDATION:
Add new text

224.0 — V —

**Valve, Balancing.** A valve that regulates and controls the return of hot water to the water heater in a recirculating potable or nonpotable hot water piping system to ensure that specified hot water temperatures are delivered to all point-of-use fixtures within specified time frames or volumes. These include the following:

1. **Flow Balancing Valve with Memory Stop.** Includes globe valve, needle valve, or venturi valve design with ports for reading temperature and pressure, knob adjustment with graduated set-point markings, and lockable memory setting.
2. **Preset Automatic Flow Control Valve.** A fixed orifice valve regulates flow by using a spring mechanism to maintain a specified flow over a variety of pressures. These function with replaceable flow cartridges, each having a different flow rate orifice assembly and with different pressure differentials.
3. **Thermostatic Flow Regulating Valve.** Mechanical thermostatically controlled valves that automatically self-adjust return water flow to maintain specified temperatures in the hot water circuits.

**SUBSTANTIATION:**
What exactly is a domestic hot water (DHW) balancing valve? Despite code enhancements and increased emphasis around domestic hot water design, a critical component of any DHW recirculation system has gone largely unaddressed. Due to the lack of a definition of a balancing valve, any valve that regulates flow can theoretically be used in a DHW recirculation system, including a ball valve. The addition of a clear definition of what a balancing valve is will allow plumbing designers to require a balancing valve designed and intended for use in DHW recirculation systems.
Proposals

Item #: 027
UPC 2024  Section: 224.0

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Revise text

224.0  – V –

Vent Connector, Gas. That portion of a gas venting system that connects a listed gas appliance beginning at the draft hood or flue collar to a gas vent and is installed entirely within the space or area in which the appliance is located.

SUBSTANTIATION:
The current simple definition of a vent connector is not clear. It can be interpreted under the current language that you could install a single wall vent for a water heater starting in the garage and run it up into the attic. This change state specifically where it begins and that it remains in the space where it begins.
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.
Proposals

Item #: 029

UPC 2024  Section: 301.2.4, 313.8, 313.9, Table 1701.1, Table 1701.2

SUBMITTER: Mr John Wilson
Taylor Kerr Engineering Ltd (Teekay Couplings)

RECOMMENDATION:
Revise text

301.0 General.

301.2.4 Cast-Iron Soil Pipe, Fittings, and Hubless Couplings. Cast-iron soil pipe, fittings, and hubless couplings shall be third party certified in accordance with ASTM C1277 and CISPI 310 or ASTM F1476 for couplings and ASTM A888, ASTM A74, and CISPI 301 for pipes and fittings.

313.0 Hangers and Supports.

313.8 Pipe Anchorage. Anchorage shall be provided to restrain drainage piping from axial movement.

313.9 Location. For pipe sizes more than 4 inches (102 mm), restraints shall be provided for drainpipes at all changes in direction and at all changes in diameter greater than two pipe sizes. Braces, blocks, rodding or other suitable methods as specified by the coupling manufacturer for ASTM F1476 Type II Class 2, flexible and restrained shall be utilized.

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 F1476-2007(R2019)</td>
<td>Performance of Gasketed Mechanical Couplings for Use in Piping Applications</td>
<td>Joints</td>
<td>301.2.4</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: ASTM F1476 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>
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</tr>
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<tbody>
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</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
The ASTM F1476 specification provides the performance characteristics and qualification tests required for gasketed mechanical couplings (GMC) including groove-type mechanical couplings for grooved end pipe, mechanical restraint couplings for plain end pipe and mechanical compression couplings for plain end pipe.

These couplings are for use at temperatures within the recommended temperature range of their respective gaskets.
Couplings manufactured to perform to this standard are utilized around the world for many pipework systems for civils, water, oil & gas, marine, plumbing and mechanical installations with a wide range of pipe materials. Gasketed mechanical pipe couplings allow pipes to be permanently joined without the need for welding, soldering or brazing, eliminating the need for on-site hot work. No pipe threading, grooving, or alternative preparation is required. This gives the system designer and contractor access to a widely used and accepted modern construction method in today's industry.

Health and safety benefits come from the simple tools required and the use of plain end pipe. There is no heating, welding or manipulation of material on site, so handling is easy and safe. The coupling is light in weight, has no loose parts and all materials are REACH and RoHS compliant and manufactured under an ISO 9001 quality programme. Gaskets are NSF 61 compliant.

The high-level performance of GMCs allows gravity systems to be uprated. For example, where CISPI 310 states that thrust restraint systems are required, a GMC can fulfil the regulation. Global manufacturers of hubless cast iron utilize GMCs in sensitive locations as part of their overall systems.
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. 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.
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.
Item #: 032
Upc 2024  Section: 305.8, 305.8.1, 305.8.2

Submitter: Robert Nicholas (Don Illingworth & Assoc., Inc., Structural Engineers Association of Texas); R. Craig McKee, P.E. (Huckabee, Inc.)

Recommendation:
Add new text

305.0 Damage to Drainage System or Public Sewer.

305.8 Expansive Soil. Where expansive soil is identified but not removed under foundations, plumbing shall be protected in accordance with Section 305.8.1 or Section 305.8.2.

305.8.1 Non-Isolated Foundations. Under foundations with slabs that are structurally supported by a subgrade, it shall be permitted for plumbing to be buried.

305.8.2 Isolated Foundations. Under foundations with a slab or framing that structurally spans over an under-floor space which isolates the slab from the effects of expansive soil swelling and shrinking, the plumbing system shall be suspended so that piping, fittings, hangers and supports are isolated by adequate void space, from the effects of expansive soil swelling and shrinking.

To protect the void space, soil shall be sloped, benched or retained in accordance with an approved design methodology. It shall not be permitted for the piping, fittings, hangers and supports below the slab or below the framing to be in contact with soil or any assemblage of materials that is in contact with soil within the active zone. It shall not be permitted for a slab and plumbing to be lifted as an assembly to create the void space unless the under-floor space has a crawl space with access to allow inspection and repair of plumbing after lifting.

Exception: It shall be permitted for the piping, fittings, hangers, and supports below the slab or below the framing to be in contact with structural elements of the foundation that are designed to resist the effects of expansive soil swelling and shrinking.

Organic materials shall not be used for hangers, supports and soil retention systems. Materials subject to corrosion shall not be used for hangers, supports and soil retention systems unless protected in an approved manner.

Where piping transitions to a buried condition beyond the perimeter of the foundation, an adequately flexible fittings shall be provided in the piping system to accommodate the effects of expansive soil swelling and shrinking.

Substantiation:
The UPC currently does not require protection of piping, fittings, hangers and supports from expansive soil. In some instances, millions of dollars of damages per facility to plumbing have been caused by expansive soil. This proposed change would require protection of piping, fittings, hangers, and supports from expansive soil under buildings to avoid these cases. Refer to the 14 page supporting document.

Supporting document(s) has been provided to the Technical Committee for review.
Proposals

Item #: 033
UPC 2024 Section: 308.0, 308.1

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

308.0 Improper Prohibited Locations.

308.1 General. Piping, fixtures, appliances, or equipment shall not be so located as to interfere with the normal use thereof or with the normal operation and use of windows, doors, or other required facilities.

SUBSTANTIATION:
This change adds “appliance” as an appliance can also interfere with the normal use of windows, doors, and facilities. Furthermore, the term "improper" is a subjective term and "prohibited" is clear, concise, and enforceable.
Proposals

Item #: 034

UPC 2024  Section: 309.6

SUBMITTER: Bruce A Pfeiffer
          Retired - City of Topeka

RECOMMENDATION:
Revise text

309.0 Workmanship.

309.6 Dead Legs. Dead legs shall have a method of flushing. The maximum length of a dead leg shall be not more than 1.5 times the diameter of the branch pipe.

(below is shown for reference only)

209.0    -- G --

Dead Leg. A section of potable water pipe which contains water that has no flow or does not circulate.

SUBSTANTIATION:
These new guidelines are recommended by industry experts for Legionella and bacteria control in potable water systems. Currently there are no restrictions in the Code on the length of pipe for a dead leg.
Proposals

Item #: 035

UPC 2024  Section: 310.1

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

310.0 Prohibited Fittings and Practices.

310.1 Fittings. No double hub fitting, single or double tee branch, single or double tapped tee branch, side inlet quarter bend, running thread, band, or saddle shall be used as a drainage fitting, except that a double hub sanitary tapped tee shall be permitted to be used on a vertical line as a fixture connection.

SUBSTANTIATION:
According to representatives of the Cast Iron Soil Pipe Institute (CISPI), the double hub sanitary tapped tee has not been made for 75 years. The reference to this fitting needs to be removed from the Code.
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.
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.
Proposals

Item #: 038

UPC 2024  Section: 311.1

SUBMITTER: Bob Adler
          Self

RECOMMENDATION:
Revise text

311.0 Independent Systems.
311.1 General. The drainage system of each new building and new work installed in an existing building shall be separate and independent from that of any other building, and, where available, every building shall have an independent connection with a public or private sewer.

Exception: Where one building stands in the rear of another building on an interior lot, and no public or private sewer is available or can be constructed to the rear building through an adjoining court, yard, or driveway, the building drain from the front building shall be permitted to be extended to the rear building.

SUBSTANTIATION:
The proposed change clarifies that the exception applies where no “public” or private sewer is available.
Proposals

Item #: 039

UPC 2024  Section: 312.9, Table 1701.1, Table 1701.2

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

312.0 Protection of Piping, Materials, and Structures.

312.9 Steel Nail Plates. Plastic and copper or copper alloy piping penetrating framing members to within 1 inch (25.4 mm) of the exposed framing shall be protected by steel nail plates not less than No. 18 gauge (0.0478 inches) (1.2 mm) in thickness. The steel nail plate shall extend along the framing member not less than 1 1/2 inches (38 mm) beyond the outside diameter of the pipe or tubing. Steel nail plates shall comply with IAPMO IGC 193. Exception: See Fuel gas piping shall be protected in accordance with Section 1210.4.3.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
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<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IGC 193-2020</td>
<td>Safety Plates, Plate Straps, Notched Plates and Safety Collars</td>
<td>Miscellaneous</td>
<td>312.9</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO IGC 193 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>
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<th>DOCUMENT NUMBER</th>
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<tbody>
<tr>
<td>IAPMO-IGC-193-2010</td>
<td>Safety Plates, Plate Straps, Notched Plates and Safety Collars</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
The section is being revised to add the existing standard for safety plates for the protection of concealed pipes running through the framing of a building. These plates are used in the industry on a daily basis and the standard will ensure such plates meet minimum safety requirements. Additionally, fuel gas tubing is required to be protected by specific requirements in Section 1210.4.3 which may include steel plates. Therefore, not an exception.
Proposals

Item #: 040

UPC 2024  Section: 312.13, 312.13.1, 312.13.2

SUBMITTER: R. Craig McKee, PE
Huckabee, Inc.

RECOMMENDATION:
Add new text

312.0 Protection of Piping, Materials, and Structures.

312.13 Expansive Soil. Where expansive soil is identified but not removed under foundations, plumbing shall be protected in accordance with Section 312.13.1 or Section 312.13.2.

312.13.1 Non-Isolated Foundations. Under foundations with slabs that are structurally supported by a subgrade, it shall be permitted for plumbing to be buried.

312.13.2 Isolated Foundations. Under foundations with a slab or framing that structurally spans over an under-floor space which isolates the slab from the effects of expansive soil swelling and shrinking, the plumbing shall be suspended so that plumbing, hangers and supports are isolated, by adequate voidspace, from the effects of expansive soil swelling and shrinking.

Exception: It shall be permitted to bury plumbing that provides drainage of an under-floor space.

To protect the voidspace, soil shall be sloped, benched or retained in accordance with an approved design methodology. It shall not be permitted for the piping, fittings, hangers and supports below the slab or below the framing to be in contact with soil or any assemblage of materials that is in contact with soil within the active zone. It shall not be permitted for a slab and plumbing to be lifted as an assembly to create the voidspace unless the under-floor space is a crawlspace with access to allow inspection of plumbing after lifting.

Exception: It shall be permitted for the piping, fittings, hangers, and supports below the slab or below the framing to in contact with structural elements of the foundation that are designed to resist the effects of expansive soil swelling and shrinking. Organic materials subject to decay shall not be used for hangers, supports and soil retention systems. Materials subject to corrosion shall not be used for hangers, supports and soil retention systems unless protected in an approved manner. Where piping transitions to a buried condition beyond the perimeter of the foundation, an adequately flexible expansion joint shall be provided in the plumbing.

SUBSTANTIATION:
The UPC currently does not require protection of plumbing hangers and supports from expansive soil. In some instances, millions of dollars of damages per facility to plumbing have been caused by expansive soil. This proposed change would require protection of plumbing, hangers, and supports from expansive soil under buildings to avoid these cases.

Supporting document(s) has been provided to the Technical Committee for review.
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.
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.

(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.
Proposals

Item #: 043
UPC 2024  Section: 314.2, 314.2.1

SUBMITTER: Armando Barragan
Self

RECOMMENDATION:
Revise text

314.0 Trenching, Excavation, and Backfill.

314.2 Tunneling and Driving. Tunneling and driving shall be permitted to be done in yards, courts, or driveways of a building site. Where sufficient depth is available to permit, tunnels shall be permitted to be used between open-cut trenches. The length of the tunneling shall be the distance required to clear the obstacle above.

Tunnels shall have a clear height of 2 feet (610 mm) above the pipe and shall be limited in length to one-half the depth of the trench, with a maximum length of 8 feet (2438 mm). Where pipes are driven, the drive pipe shall be not less than one size larger than the pipe to be laid.

314.2.1 Tunnels. Pipe installed in tunnels via tunneling or jacking shall be protected from uneven loading. Supporting structures, walls, and ceilings shall be designed to withstand the earth loads and account for earth movement and settling.

SUBSTANTIATION:
Where pipe is to be installed by jacketing or tunneling to clear a slab, driveway, or other paved area, such tunnels should not be longer than necessary, as it is difficult to refill with the appropriate backfill in longer tunnels. Furthermore, a new section is being added to address the earth loads that must be taken into account for any tunneling and to account for any earth settlement in order to protect the piping within.
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.
Proposals

Item #: 045
UPC 2024 Section: 321.0 – 321.3

SUBMITTER: Joanne Carroll
Subtegic Group Inc.

RECOMMENDATION:
Add new text

321.0 Trenchless Methodology.
321.1 General. Trenchless methodology for shall be permitted for replacement or rehabilitation of drainage piping, building sewers or building storm sewers in accordance with Section 321.2 or Section 321.3.
321.2 Cured-In-Place Pipe. Cured-in-place pipe materials shall be in accordance with Section 715.3.
321.3 Pipe Bursting. Pipe bursting trenchless methodology shall use high density polyethylene (HDPE) in compliance with ASTM F714.

Note: ASTM F714 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 instances where under slab and buried piping requires replacement or repair and excavation is difficult or even impossible. The addition of this section will provide clarity for the use of trenchless methodology in accordance with existing referenced standards in the code.
Proposals

Item #: 046

UPC 2024  Section: 402.6

SUBMITTER: Bob Adler
   Self

RECOMMENDATION: Revise text

402.0 Installation.

402.6 Flanged Fixture Connections. Fixture connections between drainage pipes and water closets, floor outlet service sinks and urinals shall be made using an approved copper alloy, hard lead, ABS, PVC, or iron flanges caulked, soldered, solvent cemented; rubber compression gaskets; or screwed to the drainage pipe. The connection shall be bolted with an approved gasket, washer, or setting compound between the fixture and the connection. The bottom of the flange shall be set on an approved firm base.

Wall-mounted water closet fixtures shall be securely bolted to the structure with an approved carrier fitting. The connecting pipe between the carrier fitting and the fixture shall be an approved material and designed to accommodate an adequately sized gasket. Gasket material shall be neoprene, felt, or similar approved types.

SUBSTANTIATION: It might go without saying but the carrier needs to be secured to the structure. The added text will ensure that the flange is secured to the structure as directed by the manufacturer.
Proposals

Item #: 047
UPC 2024  Section: 402.6, Table 1701.1, Table 1701.2

SUBMITTER: Karan Kapila  
Self

RECOMMENDATION:  
Revise text

402.0 Installation.

402.6 Flanged Fixture Connections. Fixture connections between drainage pipes and water closets, floor outlet service sinks and urinals shall be made using an approved copper alloy, hard lead, ABS, PVC, or iron flanges caulked, soldered, solvent cemented; rubber compression gaskets; or screwed to the drainage pipe. The connection shall be bolted with an approved gasket, washer, or setting compound between the fixture and the connection. The waste connection shall be joined with an approved elastomeric gasket, flange to fixture connector complying with ASME A112.4.3 or an approved setting compound. The bottom of the flange shall be set on an approved firm base.

Wall-mounted water closet fixtures shall be securely bolted to an approved carrier fitting. The connecting pipe between the carrier fitting and the fixture shall be an approved material and designed to accommodate an adequately sized gasket. Gasket material shall be neoprene, felt, or similar approved types.

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<td>Fittings</td>
<td>402.6</td>
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(portions of table not shown remain unchanged)

Note: ASME A112.4.3 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

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SUBSTANTIATION:  
This change will add the appropriate standard for plastic water closet fittings for connecting a water closet to the sanitary drainage system. These connections are a safety issue, and the addition of this standard will add clarity and direction for the end user.
Item #: 048
UPC 2024  Section: 402.6

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

402.0 Installation.

402.6 Flanged Fixture Connections. Fixture connections between drainage pipes and water closets, floor outlet service sinks and urinals shall be made using an approved copper alloy, hard lead, ABS, PVC, or iron flanges caulked, soldered, solvent cemented; rubber compression gaskets; or screwed to the drainage pipe. The connection shall be bolted with an approved gasket, washer, or setting compound between the fixture and the connection. The bottom of the flange shall be set on an approved firm base the top of the finished floor. Wall-mounted water closet fixtures shall be securely bolted to an approved carrier fitting. The connecting pipe between the carrier fitting and the fixture shall be an approved material and designed to accommodate an adequately sized gasket. Gasket material shall be neoprene, felt, or similar approved types.

SUBSTANTIATION:
This Code section allows a water closet flange to be set on the subfloor (approved firm base) which would require the use of multiple closet wax rings to create a water tight seal between the fixture and flange. The installation instructions by manufacturers is to install the flange so the bottom of the flange rests on the finished floor. This installation requires only a single bowl wax to create a water tight seal.
Proposals

Item #: 049
UPC 2024  Section: 402.6.1, 402.6.3

SUBMITTER: Bob Adler
Self

RECOMMENDATION:
Revise text

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 The 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.
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).
Proposals

Item #: 051

UPC 2024  Section: 402.6.1

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

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.

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.
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.
Proposals

Item #: 053
UPC 2024 Section: 403.4

SUBMITTER: Ronald L George
Plumb-Tech Design & Consulting Services LLC

RECOMMENDATION:
Add new text

403.0 Accessible Plumbing Facilities.

403.4 Temperature Limits at Accessible Plumbing Fixtures. The maximum water temperature discharging from any accessible plumbing fixture shall be limited to a maximum of 110°F (43°C) by one of the methods prescribed in Section 408.3.2.

(below shown for reference only)

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:
Persons using accessible fixtures do not always have feeling or sensation in their body and may be scalded inadvertently because many disabled people using accessible fixtures cannot feel temperature in their extremities. Burn Studies by Dr. Moritz & Dr. Henriques at Harvard medical college showed that, at a temperature of 110°F, it took hours to develop a serious scald burn.
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.
Proposals

Item #: 055

UPC 2024  Section: 407.1, Table 1701.1

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

407.0 Lavatories.
407.1 Application. Lavatories shall comply with ASME A112.19.1/CSA B45.2, ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4, ASME A112.19.12, CSA B45.5/IAPMO Z124, CSA B45.8/IAPMO Z403, CSA B45.11/IAPMO Z401 or CSA B45.12/IAPMO Z402. Group wash fixtures shall comply with the requirements of Section 401.2 and IAPMO IGC 156. Every 20 inches (508 mm) of rim space of a group wash fixture shall be considered as one lavatory for determining the number of lavatories required in accordance with Table 422.1. Lavatory assemblies with automatic soap dispensers, faucets, or hand dryers shall comply with IAPMO IGC 127.

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 156-2021</td>
<td>Wash Fountains and Lavatory Systems with or without Water Closets</td>
<td>Miscellaneous</td>
<td>407.1</td>
</tr>
</tbody>
</table>

Note: IAPMO IGC 156 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 IAPMO IGC 156 standard covers multi faucet assemblies which are a multi-user hand washing plumbing fixture with a single water supply or single drain. This type of technology is commonly installed in public buildings such as hospitals, penal facilities, schools, factories, or places of assembly. This standard will assist the consumer and end user in verifying that such fixture assemblies are compliant with an industry standard.
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
Proposals

Item #: 057
UPC 2024  Section: 204.0, 408.2

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

RECOMMENDATION:
Revise text

408.0 Showers.

408.2 Water Consumption. Showerheads shall have a maximum flow rate of not more than 2.5 gpm at 80 psi (9.5 L/m at 552 kPa). **Body sprays shall have a flow rate for the shower enclosure of not more than 2.5 gpm at 80 psi (9.5 L/m at 552 kPa).**

204.0 - B -

**Body Spray.** A shower device for spraying water onto a bather from other than the overhead position.

SUBSTANTIATION:
The U.S. Department of Energy added a definition of body spray to Federal Law regarding water conservation. The new definition excludes body sprays from the water conservation requirements for showerheads. This change will add the definition of body spray to Chapter 2. The definition is consistent with the DOE definition. The second part of the change is to add water conservation requirements for body sprays to the shower section. The water conservation requirements are the same as the water conservation requirements for showerheads. Body sprays discharging 2.5 gpm of water provide an adequate amount of water for cleansing while showering. This has been proven with the years of experience taking showers with showerheads discharging 2.5 gpm.
Proposals

Item #: 058
UPC 2024 Section: 408.2, Table 1701.1, Table 1701.2

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Add new text

408.0 Showers.


408.2 Tileable Shower Receptors. Tileable shower receptors shall comply with CSA B45.5/IAPMO Z124. Field installed tileable and pre-tiled shower kits shall comply with IAPMO PS 106.

(renumber remaining sections)

<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>IAPMO PS 106-2015e ¹</td>
<td>Tileable Shower Receptors and Shower Kits</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: CSA B45.5/IAPMO Z124 and IAPMO PS 106 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>IAPMO PS 106-2015e ²</td>
<td>Tileable Shower Receptors and Shower Kits</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
This standard specifies requirements for materials, manufacture, physical characteristics, performance testing, and markings for prefabricated, tileable shower receptors; and tileable and pre-tiled shower kits that are field installed, which are not currently covered in the UPC.
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.
408.3 Individual Shower and Tub-Shower Combination Control Valves. Showers and tub-shower combinations shall be provided with individual control valves of the pressure balance, thermostatic, or combination pressure balance/thermostatic mixing valve type that provide scald and thermal shock protection for the rated flow rate of the installed showerhead. These valves shall be installed at the point of use and comply with ASSE 1016/ASME A112.1016/CSA B125.16 or ASME A112.18.1/CSA B125.1.

408.3.1 Gang Showers. Where gang showers are supplied with a single temperature-controlled water supply pipe, it shall be controlled by a mixing valve that complies with ASSE 1069.

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.

6. Remote temperature monitoring, control and alert when lack line of sight. Temperature shall be permitted to be monitored remotely via a sensor and App to alert if mixed water exceeds 120°F (49°C) at the outlet. Temperature can also be adjusted via remote means.

SUBSTANTIATION:
The addition of this language adds public safety. The provision provides visibility to shower temperatures in a commercial facility mitigating scalding and Legionella risk, and allowing facility staff to respond quickly to over- and under-temperature performance.
Proposals

Item #: 061
UPC 2024  Section: 408.3.3, Table 1701.1, Table 1701.2

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Add new text

408.0 Showers.

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

408.3.3 Individual Pressure Balancing In-Line Valves for Individual Fixture Fittings. Where individual pressure balancing in-line valves for individual fixture fittings are installed, such valves shall comply with ASSE 1066. Such valves shall be installed in an accessible location. The valves shall not be utilized alone as a substitute for the balanced pressure, thermostatic or combination shower valves requirements.

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
<th>REFERENCED STANDARDS</th>
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<tbody>
<tr>
<td>STANDARD NUMBER</td>
<td>STANDARD TITLE</td>
</tr>
<tr>
<td>ASSE 1066-1997</td>
<td>Individual Pressure Balancing In-Line Valves for Individual Fixture Fittings</td>
</tr>
</tbody>
</table>

Note: ASSE 1066 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 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>ASSE-1066-1997</td>
<td>Individual Pressure Balancing In-Line Valves for Individual Fixture Fittings</td>
<td>Valves</td>
</tr>
</tbody>
</table>

(PORTIONS OF TABLE NOT SHOWN REMAINS UNCHANGED)

SUBSTANTIATION:
This standard applies to automatic pressure balancing in-line valves which are used to equalize incoming hot and cold water line pressures for the purpose of minimizing mixed water temperature variations due to pressure fluctuations when used in conjunction with a mixing valve or two handle valve set. They are not designed to limit the maximum outlet temperature at the point-of-use. These devices are intended for use in individual plumbing fixtures fittings such as shower heads, bath utility faucets, and sink and lavatory faucets.
Proposals

Item #: 062
UPC 2024  Section: 408.3.4

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Add new text

408.0 Showers.

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

408.3.4 Temperature-Actuated, Flow-Reduction Devices for Individual Fixture Fittings. Temperature-actuated, flow-reduction devices, where installed for individual fixture fittings, shall comply with ASSE 1062. A temperature-actuated, flow-reduction device shall be an approved method for limiting the water temperature to not more than 120°F (49°C) at the outlet of a faucet or fixture fitting. Such devices shall not be used alone as a substitute for the balanced-pressure, thermostatic or combination shower valves requirements or as a substitute for bathtub or whirlpool tub water-temperature-limiting valves requirements.

Note: ASSE 1062 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
This standard applies to temperature actuated, flow reduction (TAFR) valves for individual supply fittings (herein referred to as the “device”) that react to high temperature water. These valves are intended for use in-line with, or integrated into, individual plumbing supply fittings such as shower heads, bath and utility faucets, and sink and lavatory faucets. When intended for use by people with disabilities, TAFR valves covered by this standard shall also comply with ICC Standard A117.1. The use of TAFR valves does not replace the requirements for valves compliant to ASSE 1016 / ASME A112.1016 / CSA B125.16, ASSE 1069, or ASSE 1070 / ASME A112.1070 / CSA B125.70, as outlined in the model codes.
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.
Proposals

Item #: 064
UPC 2024  Section: 408.5

SUBMITTER: David Mann
CA State Pipe Trades Council

RECOMMENDATION:
Revise text

408.0 Showers.

408.5 Finished Curb or Threshold. Where a shower receptor has a finished dam, curb, or threshold, it shall be not less than 1 inch (25.4 mm) lower than the sides and back of such receptor. In no case, shall a dam or threshold be less than 2 inches (51 mm) or exceeding 9 inches (229 mm) in depth where measured from the top of the dam or threshold to the top of the drain. Each such receptor shall be provided with an integral nailing flange either integral or field installed in accordance with the manufacturer’s installation instructions, to be located where the receptor meets the vertical surface of the finished interior of the shower compartment. The flange shall be watertight and extend vertically not less than 1 inch (25.4 mm) above the top of the sides of the receptor. The finished floor of the receptor shall slope uniformly from the sides towards the drain not less than 1/8 inch per foot (10.4 mm/m), nor more than 1/2 inch per foot (41.6 mm/m). Thresholds shall be of sufficient width to accommodate a minimum 22 inch (559 mm) door. Shower doors shall open so as to maintain not less than a 22 inch (559 mm) unobstructed opening for egress. Where there is a shower without a threshold, the floor space within the same room shall be considered a wet location and shall comply with the requirements of the building, residential, and electrical codes.

Exceptions:
(1) Showers in accordance with Section 403.2.
(2) A cast-iron shower receptor flange shall be not less than 0.3 of an inch (7.62 mm) in height.
(3) For flanges not used as a means of securing, the sealing flange shall be not less than 0.3 of an inch (7.62 mm) in height.

SUBSTANTIATION:
The shower receptor must be installed with the nailing flange at rough wall. If the flange were at the finished interior the receptor would not be watertight. The 2021 UPC Section 408.1 requires manufactured shower receptors and shower bases to comply with ASME A112.19.1/CSA B45.2, ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSAB45.4, CSA B45.12/IAPMO Z402, or CSA B45.5/IAPMO Z124. All these standards give three options for the flanges:
(a) integral with the bathtub or shower base;
(b) added to an island tub or shower base in the factory; or
(c) field installed using a flange kit.

For this reason, Section 408.5 should be updated to allow for integral or field installed nailing flanges.
Item #: 065
UPC 2024  Section: 408.6

SUBMITTER: Shane Peters  
City of Santa Monica

RECOMMENDATION:  
Revise text

408.0 Showers.

408.6 Shower Compartments. Shower compartments, regardless of shape, shall have a minimum finished interior of in accordance with the following:
(1) Not less than 1024 square inches (0.6606 m$^2$), and shall also be capable of encompassing
(2) Be of sufficient dimension to accommodate 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.

SUBSTANTIATION:  
This change is intended to simplify the requirements for the area required for a shower compartment. Putting the requirements into a list format is preferable to the language in a paragraph form and is easier to comprehend. Additionally, an additional metric dimension is being added to simplify the dimension.
Item #: 066

UPC 2024  Section: 408.7

SUBMITTER:  Cathy Tran  
MN DEPT OF LABOR & INDUSTRY

RECOMMENDATION:  
Revise text

408.0 Showers.

408.7 Lining for Showers and Receptors. Shower receptors built on-site shall be watertight and shall be constructed from approved-type dense, nonabsorbent, and noncorrosive materials. Each such receptor shall be adequately reinforced, shall be provided with an approved flanged floor drain designed to make a watertight joint on the floor, and shall have smooth, impervious, and durable surfaces. Unless the shower receptor is poured on the ground as part of a slab, an approved shower liner shall be provided in accordance with the requirements of this section.

Shower receptors shall have the subfloor and rough side of walls to a height of not less than 3 inches (76 mm) above the top of the finished dam or threshold shall be first lined with sheet plastic, lead, or copper, or shall be lined with other durable and watertight materials. Showers that are provided with a built in place, permanent seat or seating area that is located within the shower enclosure, shall be first lined with sheet plastic, lead, copper, or shall be lined with other durable and watertight materials that extend not less than 3 inches (76 mm) above horizontal surfaces of the seat or the seating area.

Lining materials shall be pitched 1/4 inch per foot (20.8 mm/m) to weep holes in the subdrain of a smooth and solidly formed subbase. Such lining materials shall extend upward on the rough jambs of the shower opening to a point not less than 3 inches (76 mm) above the horizontal surfaces of the seat or the seating area, the top of the finished dam or threshold and shall extend outward over the top of the permanent seat, permanent seating area, or rough threshold and be turned over and fastened on the outside face of both the permanent seat, permanent seating area, or rough threshold and the jambs.

Nonmetallic shower subpans or linings shall be permitted to be built up on the job site of not less than three layers of standard grade 15 pound (6.8 kg) asphalt impregnated roofing felt. The bottom layer shall be fitted to the formed subbase and each succeeding layer thoroughly hot-mopped to that below. Corners shall be carefully fitted and shall be made strong and watertight by folding or lapping, and each corner shall be reinforced with suitable webbing hot-mopped in place. Folds, laps, and reinforcing webbing shall extend not less than 4 inches (102 mm) in all directions from the corner, and webbing shall be of approved type and mesh, producing a tensile strength of not less than 50 pounds per square foot (lb/ft²) (244 kg/m²) in either direction. Nonmetallic shower subpans or linings shall be permitted to consist of multilayers of other approved equivalent materials suitably reinforced and carefully fitted in place on the job site as elsewhere required in this section.

Linings shall be properly recessed and fastened to the approved backing so as not to occupy the space required for the wall covering, and shall not be nailed or perforated at a point that is less than 1 inch (25.4 mm) above the finished dam or threshold. An approved type subdrain shall be installed with a shower subpan or lining. Each such subdrain shall be of the type that sets flush with the subbase and shall be equipped with a clamping ring or other device to make a tight connection between the lining and the drain. The subdrain shall have weep holes into the waste line. The weep holes located in the subdrain clamping ring shall be protected from clogging.
SUBSTANTIATION:
The proposed added language clarifies that an exception for onsite built shower receptors that are poured and built directly on the ground, adequately reinforced, and watertight do not require shower liners as prescribed in the first two sentences of the paragraph. The proposed change is consistent with the intent of the current language of this section (408.7) but adds clarity to avoid continued confusion, for a more consistent code enforcement of this provision. An acceptable shower receptor that qualifies is one that is poured-in-place receptor construction, complete with integral threshold, sides and back directly supported by the underlying ground, and impervious watertight receptor as prescribed. The existing language of this section requires sides and back of the receptor pour must extend at least three inches above the finished threshold before wall covering.
Proposals

Item #: 067
UPC 2024  Section: 408.7.5

SUBMITTER: David Mann
CA State Pipe Trades Council

RECOMMENDATION:
Revise text

408.0 Showers.

408.7.5 Tests for Shower Receptors. Shower receptors shall be tested for watertightness by filling with water to the level of the rough threshold—\textit{a depth of not less than 2 inches (51 mm) for not less than 15 minutes}. Where no threshold is present, \textit{a 2 inch (51 mm) barrier shall be temporarily constructed for testing}. The test plug shall be so placed that both upper and under sides of the subpan shall be subjected to the test at the point where it is clamped to the drain.

SUBSTANTIATION:
The existing language does not have guidance for water depth or time requirement for testing the shower beds. The proposed depths are standard in the industry and will assist the end user install a watertight shower receptor.
Proposals

Item #: 068

UPC 2024  Section: 408.9

SUBMITTER: Steven Hart
Public Health-Seattle & King County

RECOMMENDATION:
Revise text

408.9 Location of Valves and Heads. Control valves and showerheads shall be located on the a sidewall of the shower compartments or otherwise and arranged so that the showerhead does not discharge directly at the entrance to into the shower compartment so that and the bather can adjust the valve(s) before stepping into the shower spray. Exception: Shower valve(s) or shower head(s) can be placed in an alternate location when approved by the Authority Having Jurisdiction.

SUBSTANTIATION:
There may be occasions when the shower valve may need to be installed opposite of the shower door entrance (rear wall) due to no access at side walls. There may be instances where the valves may need to be outside of the shower compartment for safety reasons to prevent thermal shock rather than arranged at the rear wall of the shower compartment. This is a concern for elderly, children, or persons with disabilities who would not expect thermal shock.
Proposals

Item #: 069
UPC 2024  Section: 409.4

SUBMITTER: Bruce Fathers
Watts Water Technologies

RECOMMENDATION:
Revise text

409.0 Bathtubs and Whirlpool Bathtubs.

409.4 Limitation of Hot Water Temperature in Bathtubs and Whirlpool Bathtubs. The maximum hot water temperature discharging from the bathtub and whirlpool bathtub filler shall be limited to 120°F (49°C). The maximum temperature shall be regulated by one of the following means:
(1) A limiting device conforming to either ASSE 1070/ASME A112.1070/CSA B125.70 or CSA B125.3.
(2) A water heater conforming to ASSE 1084.
(3) Remote temperature monitoring, control and alert when lack line of sight. Temperature shall be permitted to be monitored remotely via a sensor and App to alert if mixed water exceeds 120°F (49°C) at the outlet. Temperature can also be adjusted via remote means.

SUBSTANTIATION:
The addition of this language adds public safety. The provision provides visibility to whirlpool temperatures in a commercial/institutional facility mitigating scalding and Legionella risk and allowing facility staff to respond quickly to over- and under-temperature performance via App alerts.
Proposals

Item #: 070
UPC 2024  Section: 409.6.1

SUBMITTER: Karan Kapila
Self

RECOMMENDATION:
Revise text

409.0 Bathtubs and Whirlpool Bathtubs.

409.6 Installation and Access. Bathtubs and whirlpool bathtubs shall be installed in accordance with the manufacturer’s installation instructions. Access openings shall be of a size and opening to permit the removal and replacement of the circulation pump.

  Whirlpool pump access located in the crawl space shall be located not more than 20 feet (6096 mm) from an access door, trap door, or crawl hole.

  The circulation pump shall be located above the crown weir of the trap. The pump and the circulation piping shall be self-draining to minimize water retention.

409.6.1 Suction Fittings. Suction fittings on whirlpool bathtubs shall comply with ASME A112.19.7/CSA B45.10.

(renumber remaining sections)

SUBSTANTIATION:
Whirlpool suction fitting are too important to be lost in a paragraph. This change relocates the suction fitting into it’s own section as it has nothing to do with access or installation.
411.0 Water Closets.

411.1 Application. Water closets shall comply with ASME A112.19.2/CSA B45.1, ASME A112.19.3/CSA B45.4, or CSA B45.5/IAPMO Z124. Water closet bowls for public use shall be of the elongated type. In nurseries, schools, and other similar places where plumbing fixtures are provided for the use of children less than 6 years of age, water closets shall be of a size and height suitable for children’s use.

411.2 Hydraulic Performance. Water closet hydraulic performance shall be in accordance with ASME A112.19.2/CSA B45.1.

Note: ASME A112.19.2/CSA B45.1 meets the requirements for a mandatory reference standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION: The maximum water closet flushing volume requirements and acceptable testing variations are specified in ASME/ANSI A112.19.6 for hydraulic performance.
Proposals

Item #: 072
UPC 2024 Section: 411.2.1, 411.2.2. Table 1701.1, Table 1701.2

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

411.0 Water Closets.

411.2 Water Consumption. (remaining text unchanged)
411.2.1 Dual Flush Water Closets. Dual flush water closets shall comply with ASME A112.19.14 or IAPMO PS 50. The effective flush volume for dual flush water closets shall be defined as the composite, average flush volume of two reduced flushes and one full flush.

411.2.2 Dual Flush Valves. Dual flush water closet valves shall comply with IAPMO PS 50 or ASME A112.19.10.

(renumber remaining sections)

<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>ASME A112.19.10-2017</td>
<td>Retrofit Dual Flush Devices for Water Closets</td>
</tr>
<tr>
<td>IAPMO PS 50-2019</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>
</tr>
</tbody>
</table>

Note: ASME A112.19.10 and IAPMO PS 50 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>
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<tr>
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<td>IAPMO PS 50-2019</td>
<td>Flush Valves with Dual Flush Device for Water Closets or Water Closet Tank with an Integral Flush Valves with a Dual Flush Device</td>
</tr>
</tbody>
</table>

SUBSTANTIATION:
The current language is only covering water closets with integrated dual flush valves. However, there are dual flush valves that are either separate flush valves or as part of a complete water closet assembly. The proposed change will clarify the appropriate standard required for either.
Proposals

Item #: 073
UPC 2024  Section: 411.3

SUBMITTER: Karan Kapila
Self

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 or employee 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. Seats that are integral to the water closet shall be of the same material as the fixture.

SUBSTANTIATION:
The proposed language will prevent different materials to be utilized as water closet seats. This will prevent unsanitary conditions where bacteria can grow and collect in seams and glue if two or more materials are used. Furthermore, the addition of employees clarifies the intent of place of work or public workspace as meeting the same intent as the public.
Proposals

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.
412.0 Urinals.

412.1 Application. Urinals shall comply with ASME A112.19.2/CSA B45.1, ASME A112.19.19, or CSA B45.5/IAPMO Z124. Urinals shall have an average water consumption not to exceed 1 gallon (3.8 Lpf) of water per flush. The hydraulic performance for urinals using water for flushing shall be in accordance with ASME A112.19.2/CSA B45.1 or CSA B45.5/IAPMO Z124.

Note: ASME A112.19.2/CSA B45.1 and CSA B45.5/IAPMO Z124 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
The maximum water volume supplied water-urinal should meet the requirements and acceptable testing variations that are specified in ASME/ANSI A112.19.2/CSA B45.1 and CSA B45.5/IAPMO Z124 for hydraulic performance.
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.
Proposals

Item #: 077
UPC 2024  Section: 222.0, 412.1.1

SUBMITTER: Fredi Heimberg
STEFYFREDY LLC
Rep. URIMAT Schweiz AG

RECOMMENDATION:
Revise text

412.0 Urinals.

412.1.1 Nonwater Urinals. Nonwater urinals shall have a liquid barrier sealant or a membrane valve 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.

222.0 Trap. A fitting or device so designed and constructed as to provide, where properly vented, a liquid seal or a membrane valve that will prevent the back passage of air without materially affecting the flow of sewage or wastewater through it.

SUBSTANTIATION:
Technical substantiation / reason statement for including membrane valves/traps for waterless urinals in the new standard:

Membrane valves (traps) in waterless urinal applications were introduced more than 15 years ago and they have proven their quality & effectiveness since then in worldwide applications. Traps operating according to the principle described below are used by the majority of companies in the urinal market segment such as Geberit, Sloan/Falcon Water Technologies, Franke, Keramag, Ideal Standard, Duravit, Kuhfuss, Sphinx, Culu, Whiffaway, URIMAT and others. In Europa, Asia, South America and Australia they are widely used in waterless urinals. Today the majority of the worldwide waterless urinal market operates on membrane-trap-technology.

The membrane valves/traps are designed as one-way valves. The membrane traps can be made of waterproof materials such as Rubber, Silicon or even plastic (LDPE) and these materials make the membrane trap hold the lips close. When used, the valve opens in only one direction. It allows liquid (urine) to flow through and immediately closes shut afterward. It prevents the stink by not letting the odor from the drainage pass back into the urinal. Just like the liquid sealant, the membrane valve also needs to be replaced after a few thousand uses. Therefore, the performance of such membrane valves is very good compared to the technology of a liquid barrier.

Another advantage of membrane valves in waterless urinals is the fact, that no barrier liquid is needed or has to be renewed. Due to that chemicals which can cause health and safety issues can be completely avoided on these products. In addition membranes are more reliable in terms of service and maintenance. They offer more security when "flushing the urinal", because there is no liquid barrier to break.
The similar rubber membrane technology is used for floor drains to prevent odor problems when water-siphons become dry. These products are also well-established in the American market, for instance Green Drain.

The European guideline (https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32013D0641&from=DE) makes no difference for the trap technology, the trap as such (with liquid barrier or with a membrane valve) has to fulfill the different test procedures.
Proposals

Item #: 078
UPC 2024 Section: 414.1

SUBMITTER: Amie Rodio
Self

RECOMMENDATION:
Delete text without substitution

414.0 Dishwashing Machines.

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

(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>NSF 3-2017</td>
<td>Commercial Warewashing Equipment</td>
<td>Appliances</td>
<td>414.1</td>
</tr>
<tr>
<td>UL 749-2018</td>
<td>Household Dishwashers</td>
<td>Appliances</td>
<td>414.1</td>
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<tr>
<td>UL 921-2016</td>
<td>Commercial Dishwashers (with revisions through September 20, 2017)</td>
<td>Appliances</td>
<td>414.1</td>
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</table>

( порtions of table not shown remains unchanged)

SUBSTANTIATION:
This section is not enforceable and does not provide any information to the installer. These standards are not marked on the dishwashers and are not contained in the manufacturer’s specifications.
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>
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</thead>
<tbody>
<tr>
<td>NSF/ANSI 184-2019</td>
<td>Residential Dishwashers</td>
<td>Appliance</td>
<td>414.1</td>
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</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.
Proposals

Item #: 080
UPC 2024  Section: 414.3

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Revise text

414.0 Dishwashing Machines.

414.3 Drainage Connection. Domestic dishwashing machines shall discharge indirectly through an air gap fitting in accordance with Section 807.3 into a waste receptor, a wye branch fitting on the tailpiece of a kitchen sink, or dishwasher connection of a food waste disposer. Commercial dishwashing machines shall discharge indirectly through an air break or direct connection. The indirect discharge for commercial dishwashing machines shall be in accordance with Section 807.1, and the or by a direct connection discharge shall be in accordance with Section 704.3.

SUBSTANTIATION:
The modification is removing duplicate text regarding indirect connections for commercial dishwashing machines. The change will make the commercial dishwashing section direct and clear as to what connection options are permitted.
Proposals

Item #: 081
UPC 2024  Section: 414.3

SUBMITTER: Cathy Tran
MN DEPT OF LABOR & INDUSTRY

RECOMMENDATION:
Revise text

414.0 Dishwashing Machines.

414.3 Drainage Connection. Domestic dishwashing machines shall discharge indirectly through an air gap fitting in accordance with Section 807.3 into a waste receptor, a wye branch fitting on the tailpiece of a kitchen sink, or dishwasher connection of a food waste disposer. Commercial dishwashing machines shall discharge indirectly by means of an air gap or an air break through an air break or direct connection. The indirect discharge for commercial dishwashing machines shall be in accordance with Section 807.1, and or the direct discharge shall be in accordance with Section 704.3.

SUBSTANTIATION:
The proposed change seeks to clarify that both an air break and air gap are acceptable means of indirect waste discharge for a commercial dishwasher. As currently written, the existing language precludes the indirect discharge of a commercial dishwasher through an air gap by allowing only an air break for the indirect discharge. An air gap is an acceptable indirect discharge method that is more protective than an indirect by an air break and consistent with Section 807.1 for drainage by indirect waste pipes discharging into an approved type of open receptor for commercial dishwashers, and should be amended to reflect as such. If splashing is a concern in an air gap discharge, it is already addressed under Section 804.1 for open waste receptors.
Proposals

Item #: 082
UPC 2024  Section: 414.4, 504.7

SUBMITTER: Jeremy Brown
NSF International

RECOMMENDATION:
Add new text

414.0 Dishwashing Machines.

414.4 Lead Content. Dishwashing machines shall comply with the lead content requirements of Section 604.2.

504.0 Water Heater Requirements.

504.7 Lead Content. Water heaters shall comply with the lead content requirements of Section 604.2.

(below shown for reference only)

604.2 Lead Content. The maximum allowable lead content in pipes, pipe fittings, plumbing fittings, and fixtures intended to convey or dispense water for human consumption shall be not more than a weighted average of 0.25 percent with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures. For solder and flux, the lead content shall be not more than 0.2 percent where used in piping systems that convey or dispense water for human consumption.

Exceptions:
(1) Pipes, pipe fittings, plumbing fittings, fixtures, or backflow preventers used for nonpotable services such as manufacturing, industrial processing, irrigation, outdoor watering, or any other uses where the water is not used for human consumption.
(2) Flush valves, fill valves, flushometer valves, tub fillers, shower valves, service saddles, or water distribution main gate valves that are 2 inches (50 mm) in diameter or larger.

SUBSTANTIATION:
In September of 2020, the EPA finalized its final rule for interpreting the Safe Drinking Water Act. The final rule did change scope of products affected by the lead content requirements and sited dishwashers and water heaters as fixtures used for potable water according the final rule. See definition below:

Fixture means a receptacle or device that is connected to a water supply system or discharges to a drainage system or both. Fixtures used for potable uses shall include but are not limited to:
(1) Drinking water coolers, drinking water fountains, drinking water bottle fillers, dishwashers;
(2) Plumbed in devices, such as point-of-use treatment devices, coffee makers, and refrigerator ice and water dispensers; and
(3) Water heaters, water meters, water pumps, and water tanks, unless such fixtures are not used for potable uses.


Dishwashers and water heaters are singled out for proposed code sections because they would not normally be interpreted as fixtures intended to convey or dispense drinking water. As such they need a specific code section to require lead content to be consistent with the Safe Drinking Water Act.
Proposals

Item #: 083
UPC 2024  Section: 415.1, 415.2

SUBMITTER: Donald L. Strickland, FASPE, CPD, GPD
TK1SC

RECOMMENDATION:
Revise text

415.0 Drinking Fountains.
415.1 Application. Drinking fountains shall be self-closing and comply with ASME A112.19.1/CSA B45.2, ASME A112.19.2/CSA B45.1, or ASME A112.19.3/CSA B45.4. Drinking fountains and bottle filling stations shall also comply with NSF 61. Permanently installed electric water coolers and bottle filling stations shall also comply with UL 399.

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 text is addressing a concern with health and safety. As written, the language is overly restrictive to allow only 50 percent of drinking fountains to be substituted with bottle filling stations. There are jurisdictions that find drinking fountains unsanitary as many persons use it and there are no means of sanitizing drinking fountains. Additionally, if bottle filling stations are accepted as an equal to drinking fountains, then bottle filling stations should comply to the same requirements.
Item #: 084
UPC 2024  Section: 416.3

SUBMITTER: Bruce Fathers
Watts Water Technologies

RECOMMENDATION:
Add new text

416.0 Emergency Eyewash and Shower Equipment.

416.2 Water Supply. Emergency eyewash and shower equipment shall not be limited in the water supply flow rates. Where hot and cold water is supplied to an emergency shower or eyewash station, the temperature of the water supply shall be controlled by a temperature actuated mixing valve complying with ASSE 1071. Where water is supplied directly to an emergency shower or eyewash station from a water heater, the water heater shall comply with ASSE 1085. The flow rate, discharge pattern, and temperature of flushing fluids shall be provided in accordance with ISEA Z358.1. 

416.3 Remote Temperature Monitoring. Control and alert when lack line of sight. Temperature may be monitored remotely via a sensor and App to alert if mixed water exceeds 85°F (29.4°C) at the outlet. Temperature can also be adjusted via remote means.

(renumber remaining sections)

SUBSTANTIATION:
The addition of this language adds Public Safety. The provision provides remote visibility to eye wash, face wash, drench showers and combination unit outlet temperature mitigating scalding risk to eyes, face and body, and allowing facility staff to respond quickly to over temperature conditions and bypass mode via App alerts.
Proposals

Item #: 085

UPC 2024  Section: 417.2 – 417.4, 603.5

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 spout 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.
Proposals

Item #: 086
UPC 2024  Section: 417.5

SUBMITTER: Bruce A Pfeiffer  
Retired - City of Topeka

RECOMMENDATION:
Revise text

417.0 Faucets and Fixture Fittings.

417.5 Separate Controls for Hot and Cold Water. Where two separate handles control the hot and cold water, the handles shall be marked in such a manner to indicate to the user that the left-hand control of the faucet where facing the fixture fitting outlet shall control the hot water. Faucets and diverters shall be connected to the water distribution system so that hot water corresponds to the left side of the fixture fitting.

Single-handle mixing valves installed in showers and tub-shower combinations shall have the flow of hot water corresponding to the markings on the fixture fitting.

SUBSTANTIATION:
While the Code states that the left-hand control of the faucet is to control the hot water supply, it does not require markings on the faucet to indicate to the user which handle regulates the hot and cold water supply. This additional language will require those markings.
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.
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.
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.
Proposals

Item #: 090
UPC 2024  Section: 418.3

SUBMITTER: Tyler Leighton
Watts Water Technologies

RECOMMENDATION:
Revise text

418.0 Floor Drains.

418.3 Location of Floor Drains. Floor drains shall be installed in the following areas:
1. Toilet rooms containing two or more water closets or a combination of one water closet and one urinal, except in a dwelling unit.
2. Commercial kitchens and in accordance with Section 704.3.
3. Laundry rooms in commercial buildings and common laundry facilities in multi-family dwelling buildings. Alternatively, or in addition to a floor drain, a leak detection device equipped with automatic shut off shall be used. This automatic shut off shall automatically turn off the valve from the water supply to the washing machine that is in place.
4. Boiler rooms.

SUBSTANTIATION:
This solution would protect and insure safety to the building or home by reducing the risk of floods and proactively turning off the water supply when there is a leak at either the water heater or washing machine. (this is to align with Section 507.5).

The goal of this update in to enhance the protection and safety to building and home owner for the washing machine shut off.
Homes Current Leak Problems

- 400-500 gallons per hour (~ 8 gpm)
- $8-10K per incident after deductible

Water leaks cause $2.5B annual costs to insurance companies in USA
Proposals

Item #: 091
UPC 2024  Section: 420.3, Table 420.3

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

RECOMMENDATION:
Revise text

420.0 Sinks.

420.3 Pre-Rinse Spray Valve. Commercial food service pre-rinse spray valves shall have a maximum flow rate of 1.6 gallons per minute (gpm) at 60 pounds-force per square inch (psi) (6.0 L/m at 414 kPa) in accordance with Table 420.3 and shall be equipped with an integral automatic shutoff.

**TABLE 420.3**

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

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

SUBSTANTIATION:
Effective as of January 2019, the Department of Energy requires all pre-rinse spray valves to have a maximum flow rate of 1.28 gallons per minute (or less, depending on the product’s spray force). See the energy conservation standards specified in the Code of Federal Regulations at 10 CFR 431.266 (https://www.law.cornell.edu/cfr/text/10/431.266).
Item #: 092

UPC 2024  Section: Table 422.1

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Revise text

TABLE 422.1
MINIMUM PLUMBING FACILITIES

<table>
<thead>
<tr>
<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>5, 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</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.
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.
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.

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.
Proposals

Item #: 095
UPC 2024  Section: 422.4.2

SUBMITTER: Andrew Klein
A S Klein Engineering, PLLC
Rep. Self Storage Association

RECOMMENDATION:
Add new text

422.0 Minimum Number of Required Fixtures.

422.4 Toilet Facilities Serving Employees and Customers. Each building or structure shall be provided with toilet facilities for employees and customers. Requirements for customers and employees shall be permitted to be met with a single set of restrooms accessible to both groups.

Required toilet facilities for employees and customers located in shopping malls or centers shall be permitted to be met by providing a centrally located toilet facility accessible to several stores. The maximum travel distance from entry to any store to the toilet facility shall not exceed 300 feet (91 440 mm).

Required toilet facilities for employees and customers in other than shopping malls or centers shall have a maximum travel distance not to exceed 500 feet (152 m).

422.4.1 Access to Toilet Facilities. In multi-story buildings, accessibility to the required toilet facilities shall not exceed one vertical story. Access to the required toilet facilities for customers shall not pass through areas designated as for employee use only such as kitchens, food preparation areas, storage rooms, closets, or similar spaces. Toilet facilities accessible only to private offices shall not be counted to determine compliance with this section.

422.4.2 Factory, Industrial and Storage. The location and maximum distances of travel to required public and employee facilities in factory, industrial and storage occupancies shall be permitted to exceed that required by Section 422.4, provided that the location and maximum distance of travel are approved.

SUBSTANTIATION:
This proposal provides the AHJ the authority to increase the travel distance to restrooms from 500 ft and the number of floors between restrooms from every other floor to something more appropriate in industrial and storage buildings. Because these types of occupancies have extremely low occupancy rates, it is not a cost-effective use of space or resources to require the same number of independent restrooms when they will rarely be utilized. The new section recognizes that even though there may be members of the public present in some of these types of occupancies, occupancy rates and dwell times are extremely low. This "exception allowance" is present in the I-Codes.
Proposals

Item #: 096
UPC 2024  Section: 422.5, Table 1701.1

SUBMITTER: Joel Rigler
Self

RECOMMENDATION:
Revise text

422.0 Minimum Number of Required Fixtures.
422.5 Toilet Facilities for Workers. Toilet facilities shall be provided and maintained in a sanitary condition for the use of workers during construction. Where provided, non-sewered waste disposal systems shall comply with PSAI Z4.3.

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>REFERENCED STANDARDS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSAI Z4.3-2016</td>
<td>For Sanitation – Non-Sewered Waste Disposal Systems: Minimum Requirements</td>
<td>Toilet Facility</td>
<td>422.5</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: PSAI Z4.3 meets the requirements for a mandatory reference standard in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
Toilet facilities for workers are everywhere. APSAI Z4.3 is an ANSI standard specific for nonsewered disposal systems. The purpose of this standard is to assure that employees are provided with healthful and adequate sanitary waste-disposal facilities at places of employment not having sewered waste-disposal systems. It is important to protect the workers doing the plumbing and construction by ensuring their toilet facilities meet a minimum requirement for the health and safety of the workers. The code already addresses the important need of such facilities, this just adds the appropriate standard for such 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.
Proposals

Item #: 098
UPC 2024  Section: 422.6, 422.7, Table 1701.1

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

RECOMMENDATION:
Add new text

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
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 Z124.XX</td>
<td>Plastic 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.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.
Item #: 099
UPC 2024  Section: 501.1

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

501.0 General.

501.1 Applicability. The regulations of this chapter shall govern the construction, location, and installation of fuel burning and other types of water heaters heating potable water, together with chimneys, vents, and their connectors. The minimum capacity for storage water heaters shall be in accordance with the first-hour rating listed in Table 501.1(2). No water heater shall be hereinafter installed that does not comply with the manufacturer’s installation instructions and the type and model of each size thereof approved by the Authority Having Jurisdiction. A list of accepted water heater appliance standards is referenced in Table 501.1(1). Listed appliances shall be installed in accordance with the manufacturer’s installation instructions. Unlisted water heaters shall be permitted in accordance with Section 504.3.2.

Water heaters shall be installed in accordance with the manufacturer’s installation instructions. The final installation shall be approved by the Authority Having Jurisdiction.

SUBSTANTIATION:
The code section is currently written in vague language. The change cleans up the stricken language and makes it direct and addresses the intent of the current language.
Proposals

Item #: 100
UPC 2024  Section: 206.0, Table 501.1(1)

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>TABLE 501.1(1) WATER HEATERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE*</td>
</tr>
<tr>
<td>Electric, Household Storage</td>
</tr>
<tr>
<td>Oil-Fired Storage Tank</td>
</tr>
<tr>
<td>Gas-Fired, 75 000 Btu/h or less, Storage</td>
</tr>
<tr>
<td>Gas, Above 75 000 Btu/h, Storage and Instantaneous</td>
</tr>
<tr>
<td>Electric, Commercial Storage</td>
</tr>
<tr>
<td>Solid Fuel-Fired</td>
</tr>
<tr>
<td>Electric Instantaneous</td>
</tr>
</tbody>
</table>

For SI units: 1000 British thermal units per hour = 0.293 kW

* Dual purpose water heaters shall be installed in accordance with this code and the manufacturer's installation instructions.

206.0 - D -

**Water Heater, Dual Purpose.** An appliance utilized as a heat source for both space heating and domestic hot water applications.

SUBSTANTIATION:
The code is currently silent on dual purpose type water heaters. There are types water heaters specially designed to supply both potable water fixtures and space heating systems. The addition of this language will serve as a safety measure to ensure such designs are not overlooked. Also, the addition of a definition will clarify the intent of the code.
Proposals

Item #: 101
UPC 2024  Section: Chapter 5

SUBMITTER: IAPMO Staff - Update Extracts
NFPA 54 Extract Update

RECOMMENDATION:
Revise text

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 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)]

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

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

   \[ \text{Required Volume}_{\text{fan}} \geq \frac{15 \text{ ft}^3}{\text{ACH}} \left( \frac{I_{\text{fan}}}{1000 \text{ Btu/h}} \right) \]
For SI units: 1 cubic foot = 0.0283 m³, 1000 British thermal units per hour = 0.293 kW

(3) For purposes of these calculations, an infiltration rate greater than 0.60 ACH shall not be used in the equations in Section 506.2.2(1) and Section 506.2.2(2). [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. [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. [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 LP-Gases and installed indoors, except attended laboratory equipment, shall be equipped with safety shutoff devices of the complete shutoff type. [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 appliances, the existing system shall be enlarged as necessary required, or separate gas piping of adequate capacity shall be run from the point of delivery to the appliance provided. [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. [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. [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. [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.
A bleed line(s) from a diaphragm-type valve and a vent line(s) from an appliance pressure regulator shall not be connected to a common manifold terminating in a combustion chamber. Bleed lines shall not terminate in positive-pressure-type combustion chambers. [NFPA 54:9.1.20-9.1.18]

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 54:9.1.21-9.1.19]

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 54:9.1.22-9.1.20]

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. 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 direct vent appliances shall be installed in accordance with the manufacturer's installation instructions and Section 509.8.2. [NFPA 54:12.3.5-12.3.5.1]

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
vent connector and chimney flue 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 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 509.5.6.5. [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. [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 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 appliances.
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 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 54:12.9.3.1]

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 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 54:12.9.5.1]

509.8.5 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]

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 2 1/2 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 4 1/2 inches (114 mm) thick laid on the 4 1/2 inches (114 mm) bed for a vent connector having a diameter or greatest cross-sectional dimension greater than 18 inches (457 mm).

(4) Where factory-built chimney sections are employed, they shall be joined together in accordance with the chimney manufacturer's instructions. [NFPA 54:12.11.2.5]

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, 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 practices 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]

12.11.7 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 54:12.11.7-12.11.8]

509.10.7 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 54:12.11-14.12.11.11.3]

509.10.10 Inspection. The entire length of a vent connector shall be readily accessible for inspection, cleaning, and replacement. [NFPA 54:12.11.14-12.11.12]

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 54:12.11.12-12.11.13]

509.10.12 Medium-Heat Appliances. Vent connectors for medium-heat appliances shall not pass through walls or partitions constructed of combustible material. [NFPA 54:12.11.14-12.11.14.2]

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]


509.14 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 venting 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. 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></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>
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<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>
</tbody>
</table>
TABLE 509.7.3.4(1)
CLEARANCES FOR CONNECTORS
{{NFPA 54: TABLE 12.8.4.4}}*

<table>
<thead>
<tr>
<th>APPLIANCE</th>
<th>LISTED TYPE B GAS VENT MATERIAL</th>
<th>LISTED TYPE L VENT MATERIAL</th>
<th>SINGLE-WALL METAL PIPE</th>
<th>FACTORY-BUILT CHIMNEY SECTIONS</th>
</tr>
</thead>
<tbody>
<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>
<td>6</td>
<td>As listed</td>
</tr>
<tr>
<td>Residential boilers and furnaces with listed gas conversion burner and with draft hood</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>As listed</td>
</tr>
<tr>
<td>Residential appliances listed for use with Type L vents</td>
<td>Not permitted</td>
<td>As listed</td>
<td>9</td>
<td>As listed</td>
</tr>
<tr>
<td>Unlisted residential appliances with draft hood</td>
<td>Not permitted</td>
<td>6</td>
<td>9</td>
<td>As listed</td>
</tr>
<tr>
<td>Residential and low-heat appliances other than those above</td>
<td>Not permitted</td>
<td>9</td>
<td>18</td>
<td>As listed</td>
</tr>
<tr>
<td>Medium-heat appliances</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>36</td>
<td>As listed</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.

FIGURE 509.7.3.4(1)\(^1, 2, 3\)
EXTENT OF PROTECTION NECESSARY TO REDUCE CLEARANCES FROM GAS APPLIANCE OR VENT CONNECTORS
{{NFPA 54: FIGURE 10.3.2.3(a)-10.3.3.3(a)}}
For SI units: 1 inch = 25.4 mm

**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)]

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(c)-10.3.3.3(c)]
### TABLE 509.7.3.4(2)
REDUCTION OF CLEARANCES WITH SPECIFIED FORMS OF PROTECTION

**[NFPA 54: TABLE 10.2.3.4(2)]**

**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)]**

<table>
<thead>
<tr>
<th>TYPE OF PROTECTION</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>36 (inches)</td>
<td>18 (inches)</td>
</tr>
<tr>
<td>ABOVE COLUMN 1</td>
<td>SIDES AND REAR COLUMN 2</td>
<td>SIDES AND REAR COLUMN 2</td>
</tr>
<tr>
<td>1. 3½ inch thick masonry wall without ventilated air space</td>
<td>—</td>
<td>24</td>
</tr>
<tr>
<td>2. ½ 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. 3½ 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. ½ 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, °C = (°F - 32)/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 0.1 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 it be less than the clearances specified 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 in Section 509.8.1.</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 inch</td>
</tr>
<tr>
<td>B</td>
<td>Clearance to window or door that is openable</td>
<td>6 inches for appliances $\leq 10 000$ Btu/hr</td>
<td>4 feet below or to side of opening or 1 foot above</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 inches for appliances $&gt; 10 000$ Btu/hr</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 inches for appliances $\leq 50 000$ Btu/hr</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 inches for appliances $&gt; 50 000$ Btu/hr</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>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></td>
</tr>
<tr>
<td>C</td>
<td>Clearance to non-openable window</td>
<td>None unless otherwise specified by the appliance manufacturer</td>
<td></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></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).
Proposals

Item #: 102
UPC 2024  Section: 504.3.2

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

504.0 Water Heater Requirements.

504.3 Clearance. (remaining text unchanged)

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]

504.3.2 Unlisted Water Heaters. Except as otherwise permitted in this code, unlisted water heaters shall be approved by the Authority Having Jurisdiction prior to being installed. Clearance for unlisted water heaters shall be not less than 12 inches (305 mm) on all sides. Combustible floors under unlisted water heaters shall be protected in an approved manner.

SUBSTANTIATION:
New Section 504.3.2 is being proposed to replace the existing language. As currently written, there is no direction for the approval that is required of the AHJ. These provisions are important and required for the installation of unlisted water heaters such as boilers. This new section will address that issue and rewrites the provisions in a more concise and clear manner.
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.

(for information 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.
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.
2. The drainage pan shall be not less than 1 1/2 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.
Proposals

Item #: 105

UPC 2024  Section: 507.5

SUBMITTER: David Mann  
CA State Pipe Trades Council

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, or where damage results from a leaking water heater, a watertight pan of corrosion-resistant materials shall be installed beneath the water heater with not less than ¾ of an inch (20 mm) diameter drain to an approved location. The terminating end of the drainpipe shall be readily visible. Such pan shall be not less than 1½ inches (38 mm) in depth.

SUBSTANTIATION:
The proposed change will clarify 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.
Proposals

Item #: 106

UPC 2024  Section: 507.5

SUBMITTER: Arnie Rodio
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 or where structural damage could result from a leaking water heater, a watertight pan of corrosion-resistant materials not less than 1-1/2 inches (38 mm) in depth shall be installed beneath the water heater with a drain not less than 3/4 of an inch (20 mm) and diameter drain of materials shown in Table 701.2, to an approved location. Discharge from a relief valve into a water heater pan shall be prohibited. Such pan shall be not less than 1-1/2 inches (38 mm) in depth.

SUBSTANTIATION:
The proposed change defines why the drainage pan is required. It’s not for any or every kind of damage, it is there to mitigate structural damage. The change moves the last sentence to where it belongs but also defines what material is required for the drain by referencing Table 701.2 (Materials for Drain, Waste, Vent Pipe and Fittings). The prohibition in Section 608.5(7) is that you cannot drain the pressure relief into the drainage pan and is shown here for clarity. This is a common mistake and needs to be stated in both sections.
Proposals

Item #: 107
UPC 2024  Section: 507.5

SUBMITTER: Shane Peters  
City of Santa Monica

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 or where structural damage could result from a leaking water heater, a watertight pan of corrosion-resistant materials, not less than 1½ inches (38 mm) in depth, shall be installed beneath the water heater with a drain not less than ¾ of an inch (20 mm) diameter drain to an approved location. Discharge from a relief valve into a water heater pan shall be prohibited. Such pan shall be not less than 1½ inches (38 mm) in depth.

SUBSTANTIATION:
This change clarifies the intent of why the pan is required. It's not any or every kind of damage, it is there to mitigate structural damage. Also, the same prohibition of not allowing discharging the relief valve into a water heater pan is in Section 608.5(7). It is a common mistake and needs to be stated in both sections.
507.0 Appliance and Equipment Installation Requirements.

507.13 Installation in Residential Garages. Appliances in residential garages and in adjacent spaces that open to the garage and are not part of the living space of a dwelling unit shall be installed so that all heating elements, switches, burners, and burner-ignition devices are located not less than 18 inches (457 mm) above the floor unless listed as flammable vapor ignition resistant. [NFPA 54:9.1.10.1].

SUBSTANTIATION:
Requirements for electric water heaters have been missing since the 2003 UPC. The reasons for this may no longer exist and are perhaps unimportant. The fact is that electric water heaters are still installed by plumbers and still need inspections. What document do plumbers and inspectors seek for these installation requirements. Elements and switches (thermostats) are just as dangerous as burners and burner ignition devices, perhaps more so with the advent of FVIR for gas burning water heaters.
Proposals

Item #: 109
UPC 2024  Section: 507.26

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

507.0 Appliance and Equipment Installation Requirements.

507.26 Accessibility for Service. All appliances shall be located with respect to building construction and other equipment so as to permit access to the appliance. Sufficient clearance shall be maintained to permit cleaning of heating surfaces; the replacement of filters, blowers, motors, burners, controls, and vent connections; the lubrication of moving parts where necessary; the adjustment and cleaning of burners and pilots; and the proper functioning of explosion vents, if provided. For attic installation, the passageway and servicing area adjacent to the appliance shall be floored. [NFPA 54:9.2.1]

SUBSTANTIATION:
The change is a cleanup of the language to improve Section 507.26. The term “sufficient” is being removed as it is ambiguous code language.
Proposals

Item #: 110
UPC 2024 Section: 507.26

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

507.0 Appliance and Equipment Installation Requirements.

507.26 Accessibility for Service. All appliances shall be located with respect to building construction and other equipment so as to permit access to the appliance for repair or replacement of the appliance. Sufficient clearance shall be maintained to permit removal of the appliance; cleaning of heating surfaces; the replacement of filters, blowers, motors, burners, controls, and vent connections; the lubrication of moving parts where necessary; the adjustment and cleaning of burners and pilots; and the proper functioning of explosion vents, if provided. For attic installation, the passageway and servicing area adjacent to the appliance shall be floored. \[NFPA 54:9.2.1\]

SUBSTANTIATION:
The Code requires access for the repair of appliances in Section 507.26, but does not require access for the removal of appliances without the need to remove building construction or other appliances.
Proposals

Item #: 111

UPC 2024  Section: 508.2.1.1, Table 1701.1

SUBMITTER: Lauren Bauerschmidt
ASSP

RECOMMENDATION:
Revise text

508.2.1.1 Guards and Rails. Guards or rails shall be required where the following exist:
(1) The clearance between the appliance and a roof edge or open end of an equipment platform is less than 6 feet (1829 mm).
(2) The open end of the equipment platform is located more than 30 inches (762 mm) above the roof, floor, or grade below.
Where guards or rails are installed, they shall be constructed so as to prevent the passage of a 21 inch (533 mm) diameter ball, resist the imposed loading conditions, and shall extend not less than 30 inches (762 mm) beyond each side of the equipment or appliance.
Exception: Guards shall not be required where a permanent fall arrest anchorage connector system in accordance with ASSE ASSP Z359.1 is installed.

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>ASSE-ASSP Z359.1-2016-2020</td>
<td>The Fall Protection Code</td>
<td>Miscellaneous</td>
<td>508.2.1.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: ASSP Z359.1 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 above revisions reflect the latest updates to the ASSP standard that is referenced in Table 1701.1. The promulgator standard has changed names from "ASSE" to "ASSP" and has also been updated in Section 508.2.1.1.
Proposals

Item #: 112
UPC 2024 Section: 508.0, 508.4.1

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

508.0 Appliances on Roofs, in Attics or Under-Floor Spaces.

508.4 Appliances in Attics and Under-Floor Spaces. (remaining text unchanged)
508.4.1 Length of Passageway. Where the height of the passageway is less than 6 feet (1829 mm), the distance from the passageway access to the appliance shall not exceed 20 feet (6096 mm) measured along the centerline of the passageway. [NFPA 54:9.5.1.1] Where the height of the passageway is 6 feet (1829 mm) or more, the distance from the passageway access to the appliance shall not exceed 50 feet (15 240 mm) measured along the centerline of the passageway.

SUBSTANTIATION:
This code change would limit the length of a passageway that is 6 feet high or more to a maximum length of 50 feet to remove the conflict between the building/residential code. There is currently no limit or provisions for a distance for a passageway greater than 6 feet in height.

Additionally, provisions under Section 508.0 cover more than just “appliances on roofs.” In addition to roofs, it covers appliances in attics and in under-floor spaces (Section 508.4). Updating the main title will assist in clarifying the intent of the section and all its sub-sections.
Proposals

Item #: 113

UPC 2024  Section: 509.2, 509.3

SUBMITTER:  David Mann
CA State Pipe Trades Council

RECOMMENDATION:
Add new text

509.0 Venting of Appliances.

509.2 Venting of Gas Appliances. Low-heat and medium-heat gas appliances shall be vented in accordance with this chapter. Other gas appliances shall be vented in accordance with NFPA 211 or other applicable standards.

509.3 Appliances Fueled by Other Fuels. Appliances fueled by fuels other than gas shall be vented in accordance with NFPA 211 and the appliance manufacturer's instructions.

(renumber remaining sections)

Note: NFPA 211 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 UPC only addresses low and medium heat appliances. The new language will guide the user of the code to the appropriate standard NFPA 211 for other gas appliances. NFPA 211 (Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances) applies to the design, installation, maintenance, and inspection of all chimneys, fireplaces, venting systems, and solid fuel-burning appliances. The standard covers the removal of waste gases; the reduction of fire hazards associated with the construction and installation of chimneys, fireplaces, and venting systems for residential, commercial, and industrial appliances; and the installation of solid fuel-burning appliances.
Proposals

Item #: 114
UPC 2024  Section: 509.6.1.1

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

509.0 Venting of Appliances.

509.6.1.1 Insulation Protection Shield. Where a vent passes through an insulated assembly, an approved metal shield constructed of steel having a thickness of not less than 26 gauge shall be installed between the vent and insulation. The shield shall extend not less than 2 inches (51 mm) above the insulation and be secured to the structure in accordance with the manufacturer’s installation instructions.

SUBSTANTIATION:
The existing language does not contain guidance regarding the minimum gauge required for insulation shield passing through insulated areas such as attics. The proposed language will add the minimum shield thickness. The proposed 26 gauge minimum thickness is found in other manufacturer requirements.
Proposals

Item #: 115
UPC 2024  Section: 509.10.5

SUBMITTER: Arnie Rodio  Self

RECOMMENDATION:  Revise text

509.10 Vent Connectors for Category I Appliances.

509.10.5 Joints. Joints between sections of connector piping and connections to flue collars or draft hood outlets shall be fastened in accordance with one of the following methods:

(1) **Sheet-metal screws.** Mechanically fastened by means of not less than three sheet-metal screws equally spaced around the joint.

(2) Vent connectors of listed vent material assembled and connected to flue collars or draft hood outlets in accordance with the manufacturer’s instructions.

(3) Other approved means. ([NFPA 54:12.11.6])

SUBSTANTIATION:

One: there is a potential conflict with the 2021 UMC Section 603.9:
"UMC - 603.9 Joints and Seams of Ducts. Joints and seams for duct systems shall comply with SMACNA HVAC Duct Construction Standards – Metal and Flexible. Joints of duct systems shall be made substantially airtight by means of tapes, mastics, gasketing, or other means. Crimp joints for round ducts shall have a contact lap of not less than 1-1/2 inches (38 mm) and shall be mechanically fastened by means of not less than three sheet-metal screws equally spaced around the joint, or an equivalent fastening method."

Two: A common practice is to use one or two screws which can allow the vent to swivel and become dislodges and leak carbon monoxide and other exhaust gases.

Three: Some installers use an aluminum tape typically used for HVAC plenums. This product can not take the heat and will fall off many times again exhausting gas into the space.
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.
Proposals

Item #: 117
UPC 2024 Section: 510.2.11

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Revise text

510.0 Sizing of Category I Venting Systems.

510.2 Multiple Appliance Vent Table 510.2(1) through Table 510.2(9). (remaining text unchanged)

510.2.11 Vent Connector Rise. The connector rise (R) for each appliance-a vent connector shall be measured from the draft hood outlet or flue collar to the centerline where the vent gas streams come together. [NFPA 54:13.2.12]

SUBSTANTIATION:
This is about the vent connector, not the appliance it connects to so eliminates unnecessary wording and focuses on the vent connector.
Proposals

Item #: 118
UPC 2024 Section: 603.2

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Revise text

603.0 Cross-Connection Control.

603.2 Approval of Devices or Assemblies. Before a device or an assembly is installed for the prevention of backflow, it shall have first been approved by the Authority Having Jurisdiction. Devices or assemblies shall be tested in accordance with recognized standards or other standards acceptable to the Authority Having Jurisdiction. Backflow prevention devices and assemblies shall comply with Table 603.2, except for specific applications and provisions as stated in Section 603.5.1 through Section 603.5.21.

Devices or assemblies installed in a potable water supply system for protection against backflow shall be maintained in good working condition by the person or persons having control of such devices or assemblies. Such devices or assemblies shall be tested at the time of installation, repair, or relocation and not less than on an annual schedule thereafter, or more often where required by the Authority Having Jurisdiction. Where found to be defective or inoperative, the device or assembly shall be repaired or replaced. No device or assembly shall be removed from use or relocated or other device or assembly substituted, without the approval of the Authority Having Jurisdiction.

Testing or maintenance shall be performed by a certified backflow assembly tester or repairer certified in accordance with ASSE Series 5000 or otherwise any other additional certification approved by the Authority Having Jurisdiction.

SUBSTANTIATION:
The proposed change defines and clarifies that ASSE 5000 is a certification standard. The removal of "otherwise" strengthens this requirement by defining and clarifying another certification is needed that is acceptable to the Authority Having Jurisdiction.
Proposals

Item #: 119

UPC 2024  Section: Table 603.2

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Revise text

TABLE 603.2
BACKFLOW PREVENTION DEVICES, ASSEMBLIES, AND METHODS

<table>
<thead>
<tr>
<th>DEVICE, ASSEMBLY, OR METHOD</th>
<th>APPLICABLE STANDARDS</th>
<th>POLLUTION (LOW HAZARD)</th>
<th>CONTAMINATION (HIGH HAZARD)</th>
<th>INSTALLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BACK-SIPHONAGE</td>
<td>BACK-PRESSURE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Chemical Dispenser with integral backflow protection

ASSE 1055

X

Shall be installed in accordance with manufacturer’s installation instructions with dedicated water supply whenever possible

(portions of table not shown remain unchanged)

Note: ASSE 1055 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
ASSE 1055 Standard is commonly used in the industry and should be added to Table 603.2 like other commonly installed backflow devices listed in this table.
Proposals

Item #: 120

UPC 2024  Section: Table 603.2

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Revise text

| TABLE 603.2 |
| BACKFLOW PREVENTION DEVICES, ASSEMBLIES, AND METHODS |
| DEGREE OF HAZARD |
| DEVICE, ASSEMBLY, OR METHOD\(^1\) | APPLICABLE STANDARDS | POLLUTION (LOW HAZARD) | CONTAMINATION (HIGH HAZARD) | INSTALLATION\(^2,3\) |
| | | BACK-SIPHONAGE | BACK-PRESSURE | BACK-SIPHONAGE | BACK-PRESSURE |
| Hose connection backflow preventers | ASSE 1052 | X | — | X | — | Such devices are not for use under continuous pressure conditions.\(^4,6\) |
| Laboratory faucet backflow preventer | ASSE 1035 | — | X | — | X | Such devices are not for use under continuous pressure conditions. No valve downstream.\(^4\) |

(ports of table not shown remain unchanged)

(row with ASSE 1052 is shown for informational purposes only)

**SUBSTANTIATION:**
Both ASSE 1052 and ASSE 1035 standards contain the same protection, two checks, and an atmospheric port. The protection level should be the same. They are both also rated for low pressure backpressure (10 feet of head or 4.33 psi).
### TABLE 603.2
BACKFLOW PREVENTION DEVICES, ASSEMBLIES, AND METHODS

<table>
<thead>
<tr>
<th>DEVICE, ASSEMBLY, OR METHOD</th>
<th>APPLICABLE STANDARDS</th>
<th>POLLUTION (LOW HAZARD)</th>
<th>CONTAMINATION (HIGH HAZARD)</th>
<th>INSTALLATION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BACK-SIPHONAGE</td>
<td>BACK-PRESSURE</td>
<td></td>
</tr>
<tr>
<td>Double Check Detector Fire Protection Backflow Prevention Assembly (two independent check valves with a parallel detector assembly consisting of a water meter and either a double check valve backflow prevention assembly or a single check for a Type II assembly, and means for field testing)</td>
<td>ASSE 1048</td>
<td>X</td>
<td>X</td>
<td>-</td>
</tr>
<tr>
<td>Reduced Pressure Detector Fire Protection Backflow Prevention Assembly (two independently)</td>
<td>ASSE 1047</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Horizontal unless otherwise listed. Access and clearance shall be in accordance with the manufacturer’s instructions, and not less than a 12 inch clearance at the bottom for maintenance. May need platform/ladder for test and repair. Does not discharge water. Installation includes a fire protection system and is designed to operate under continuous pressure conditions.
Acting loaded check valves, a differential pressure relief valve, with a parallel detector assembly consisting of a water meter and either a reduced-pressure principle backflow prevention assembly or a single check for a Type II assembly, and means for field testing.

| Dual Check Valve Type Backflow Preventers for Carbonated Beverage Dispensers, Post Mix Type | ASSE 1032 | X | X | - | - |
| Installation includes carbonated beverage machines or dispensers but is also suitable for other beverage dispensers such as coffee machines, as well as ice machines. These devices operate under intermittent or continuous pressure conditions. |

(Note: ASSE 1032 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>TABLE 1701.1</th>
<th>REFERENCED STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARDS NUMBER</td>
<td>STANDARD TITLE</td>
</tr>
<tr>
<td>ASSE 1032-2004 (R2021)</td>
<td>Dual Check Valve Type Backflow Preventers for Carbonated Beverage Dispensers, Post Mix Type</td>
</tr>
</tbody>
</table>

(Notes of table not shown remain unchanged)
SUBSTANTIATION:
The type-II bypass is approved for use in DCDA and RPDA devices (ASSE 1048 and ASSE 1047, respectively) by the two major standard-writing organizations for backflow preventers, ASSE and USCFCCCHR. The type-II bypass has been part of these standards for over 10 years. The type II bypass consists of a water meter, and a single check, as it bypasses only the 2nd check of main DC/RP. This currently conflicts with language in Section 603.3.8 and Section 603.3.9, as well as Table 603.2.

ASSE 1032 devices are not currently included in the body of 2021 UPC. I have added the ASSE 1032 devices along with common and reasonable applications.
Proposals

Item #: 122
UPC 2024  Section: TIA UPC Table 603.2

SUBMITTER: Joel F. Hipp
Hobart, Div. ITW Food Equipment Group

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>DEVICE, ASSEMBLY, OR METHOD¹</th>
<th>APPLICABLE STANDARDS</th>
<th>POLLUTION (LOW HAZARD)</th>
<th>CONTAMINATION (HIGH HAZARD)</th>
<th>INSTALLATION²,³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmospheric vacuum breaker (consists of a body, checking member and atmospheric port)</td>
<td>ASSE 1001 or CSA B64.1.1</td>
<td>X</td>
<td>—</td>
<td>X</td>
</tr>
</tbody>
</table>

(portions of the table not shown remain unchanged)

SUBSTANTIATION:

Technical Merit: The 2021 UPC has a conflict regarding the installation requirements for atmospheric vacuum breakers (AVB). Table 603.2 states that there shall be “No valve downstream”. However, ASSE 1001 was updated in 2017 to remove the wording "no valve downstream" and add, "have its outlet open to atmosphere" (Attachment 1 of TIA 001-21). Table 1701.1 in the 2021 UPC for Reference Standards includes the 2017 edition of ASSE 1001 (Attachment 2 of TIA 001-21). Therefore, the installation requirements for atmospheric vacuum breakers in Table 603.2 must be updated as shown above to correct this conflict with the 2017 edition of ASSE 1001. Allowing a valve downstream from an AVB that does not create backpressure on the device is not a public health hazard.

Historically, a valve in the outlet to the AVB would create backpressure if it were considered a control valve and completely stopped the flow of water exiting the AVB. However, if the valve is not a shutoff or control valve, and is located in a branch of a TEE that does not block the outlet of the AVB to atmosphere, the intent of the requirement is met. Prohibiting any downstream valve is design restrictive and does not represent current certified designs that meet the intent of the code, which is to prevent backpressure on the AVB.

The validity of applications with a valve downstream from an AVB can be confirmed by the UPC 18-101 Request for Clarification issued by Bruce Pfeiffer, Chair of the UPC Answers and Analysis Committee (attachment 3 of TIA 001-21).
Updates to nationally recognized standards referenced in the UPC must always be taken into consideration so that the public can fully benefit from advancements in technology. Otherwise there would be confusion for anyone enforcing the UPC or applying the standards.

Emergency nature:
1) Hardship on Owners/Users of Equipment - There are currently many commercial dishwashing machines on the market with an auxiliary valve downstream of an AVB. The valve is in a branch of a TEE that cannot prevent the AVB from being open to atmosphere. However, since it does not meet the literal interpretation of the wording in Table 603.2 of the UPC, some AHJ's have required these customers to replace the AVB with an RPZ or Spill Resistant Pressure Vacuum Breaker. Results of these nonconformance citations:
   - Delays in receiving a final CO
   - Plumbing modification fees from $1,200 to $2,000 per site
   - Loss of manufacturer warranty due to non-standard part replacements
   - Voiding the third-party sanitation certification
2) Loss of NSF Certification – When an NSF Certified commercial dishwashing machine is modified to replace the AVB with an untested device, that NSF Certification is rendered null and void. As such, the customer is susceptible to a possible public health citation for using a noncertified dishmachine. An even more significant ramification is a possible reduction in the sanitizing efficacy of the dishmachine which is a potential public health concern.

Supporting document(s) has been provided to the Technical Committee for review.
Proposals

Item #: 123

UPC 2024  Section: Table 603.2

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Revise text

| TABLE 603.2 |
| BACKFLOW PREVENTION DEVICES, ASSEMBLIES, AND METHODS |
| DEGREE OF HAZARD |

<table>
<thead>
<tr>
<th>DEVICE, ASSEMBLY, OR METHOD¹</th>
<th>APPLICABLE STANDARDS</th>
<th>POLLUTION (LOW HAZARD)</th>
<th>CONTAMINATION (HIGH HAZARD)</th>
<th>INSTALLATION²,³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backflow preventer for Carbonated Beverage Dispensers (two independent check valves with a vent to the atmosphere)</td>
<td>ASSE 1022</td>
<td>X</td>
<td>____</td>
<td>____</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
ASSE 1022 it is currently listed as approved only for low hazard backsiphonage. It should be listed at a minimum for both low hazard backsiphonage and low hazard backpressure. Also, since it is installed on what is a high hazard cross-connection it should be listed for high hazard backsiphonage and high hazard backpressure.
Proposals

Item #: 124
UPC 2024  Section: 603.3.8

SUBMITTER: Cameron Rapoport
Watts Water Technologies

RECOMMENDATION:
Revise text

603.0 Cross-Connection Control.

603.3 Backflow Prevention Devices, Assemblies, and Methods. (remaining text unchanged)

603.3.8 Double Check Detector Fire Protection Backflow Prevention Assembly. A double check valve backflow prevention assembly with a parallel detector assembly consisting that either bypasses both checks in the double check valve backflow prevention assembly (DC) and consists of a water meter and a double check valve backflow prevention assembly (DC), or bypasses the second check of the double check valve backflow prevention assembly and consists of a water meter and a single check.

SUBSTANTIATION:
The type-II bypass is approved for use in DCDA and RPDA devices (ASSE 1048 and ASSE 1047, respectively) by the two major standard-writing organizations for backflow preventers, ASSE and USCFCCCHR. The type-II bypass has been part of these standards for over 10 years. The type II bypass consists of a water meter, and a single check, as it bypasses only the 2nd check of main DC/RP. This currently conflicts with language in Section 603.3.8, Section 603.3.9, and Table 603.2.
Proposals

Item #: 125
UPC 2024  Section: 603.3.9

SUBMITTER: Cameron Rapoport
Watts Water Technologies

RECOMMENDATION:
Revise text

603.0 Cross-Connection Control.

603.3 Backflow Prevention Devices, Assemblies, and Methods. (remaining text unchanged)

603.3.9 Reduced Pressure Detector Fire Protection Backflow Prevention Assembly. A reduced-pressure principle backflow prevention assembly with a parallel detector assembly consisting either bypassing both checks of the reduced pressure principle backflow preventer and consisting of a water meter and a reduced-pressure principle backflow prevention assembly (RP), or bypassing the second check of the reduced pressure principle backflow preventer and consisting of a water meter and a single check.

SUBSTANTIATION:
The type-II bypass is approved for use in DCDA and RPDA devices (ASSE 1048 and ASSE 1047, respectively) by the two major standard-writing organizations for backflow preventers, ASSE and USCFCCCHR. The type-II bypass has been part of these standards for over 10 years. The type II bypass consists of a water meter, and a single check, as it bypasses only the 2nd check of main DC/RP. This currently conflicts with language in Section 603.3.8 and Section 603.3.9, as well as Table 603.2.
Proposals

Item #: 126
UPC 2024  Section: 603.4.7

SUBMITTER: Cameron Rapoport
Watts Water Technologies

RECOMMENDATION:
Revise text

603.0 Cross-Connection Control.

603.4 General Requirements. (remaining text unchanged)

603.4.7 Freeze Protection. In cold climate areas, backflow assemblies and devices shall be protected from freezing with an outdoor enclosure that complies with ASSE 1060 or by a method acceptable to the Authority Having Jurisdiction. For indoor installations where freezing conditions may occur and heat, insulation, or both may be inadequate, digital monitoring of temperature with low temperature alerts shall be required.

SUBSTANTIATION:
In areas subjected to outdoor freezing temperatures, backflow preventer failure can occur in indoor mechanical rooms when not adequately heated, which is often the case. This is particularly true for fire sprinkler system backflow assemblies, as there is not flow of water to prevent freezing. In these cases, removal of the valve would not be possible, and insulation may be tampered with, lost, or inadequate due to both low water and ambient temperature. In such cases, digital monitoring systems with either a separate alarm or connection to a Building Management System (BMS) will alert users to take action to prevent damage to the backflow preventer.
Proposals

Item #: 127
UPC 2024  Section: 603.5.6, Table 1701.1, Table 1701.2

SUBMITTER: Tim Collings
self

RECOMMENDATION:
Revise text

603.0 Cross-Connection Control.

603.5 Specific Requirements. (remaining text unchanged)

603.5.6 Protection from Lawn Sprinklers and Irrigation Systems. Potable water supplies to systems having no pumps or connections for pumping equipment, and no chemical injection or provisions for chemical injection, shall be protected by a valve complying with IAPMO PS 72, or protected from backflow by one of the following devices:
(1) Atmospheric vacuum breaker (AVB)
(2) Pressure vacuum breaker backflow prevention assembly (PVB)
(3) Spill-resistant pressure vacuum breaker (SVB)
(4) Reduced-pressure principle backflow prevention assembly (RP)

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>REFERENCED STANDARDS</td>
</tr>
<tr>
<td>STANDARDS NUMBER</td>
</tr>
<tr>
<td>IAPMO PS 72-2019</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO PS 72 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>TABLE 1701.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES</td>
</tr>
<tr>
<td>DOCUMENT NUMBER</td>
</tr>
<tr>
<td>IAPMO PS 72-2007st</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
Valves covered by this standard are intended for cold water installations requiring an integral anti-siphon device to prevent house water contamination when installed per the manufacturer’s instructions.
Proposals

Item #: 128
UPC 2024  Section: 603.5.12, Table 1701.1, Table 1701.2

SUBMITTER: Cameron Rapoport
Watts Water Technologies

RECOMMENDATION:
Revise text

603.0 Cross-Connection Control.

603.5 Specific Requirements. (remaining text unchanged)

603.5.12 Beverage Dispensers. Potable water supply to beverage dispensers, carbonated beverage dispensers, or coffee machines shall be protected by an air gap or vented backflow preventer that complies with ASSE 1022. For carbonated beverage dispensers, piping material installed downstream of the backflow preventer shall not be affected by carbon dioxide gas. Non-carbonated beverage dispensers, such as ice makers and coffee machines, shall be protected by an air gap or dual check backflow preventer that comply with ASSE 1032 or ASSE 1024.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSE 1032-2004</td>
<td>Dual Check Valve Type Backflow Preventers for Carbonated Beverage Dispensers, Post Mix Type</td>
<td>Backflow Protection</td>
<td>603.5.12</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: ASSE 1032 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>ASSE-1032-2004 (R2011)</td>
<td>Dual Check Valve Type Backflow Preventers for Carbonated Beverage Dispensers, Post Mix Type</td>
<td>Backflow Protection</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: ASSE 1032 and ASSE 1024 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
Post-mix type carbonated beverage dispensers present a higher hazard than non-carbonated beverage dispensers, and therefore the added protection of an atmospheric vent in an ASSE 1022 compliant device is appropriate. However, non-carbonated beverage dispensers present less of a hazard as they do not produce carbonic acid, and therefore a dual check would be an appropriate device. There are two ASSE standards for dual checks, ASSE 1032 and ASSE 1024.
Though ASSE 1032 states it is specifically for carbonated beverage, examination of the standard leaves no reason it would not be appropriate for non-carbonated beverage. Additionally, ASSE 1032 are more commonly available in appropriate sizes (1/4", 3/8") than ASSE 1024 devices, and with more appropriate end connections given that their intended application is for beverage dispensing.
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.
Proposals

Item #: 130
UPC 2024 Section: 206.0, 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 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 vale 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 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 downside 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 one’s 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.
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.
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>TABLE 1701.1</th>
<th>REFERENCED STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD NUMBER</td>
<td>STANDARD TITLE</td>
</tr>
<tr>
<td>IAPMO PS 104-2019</td>
<td>Pressure Relief Connection for Dispensing Equipment</td>
</tr>
</tbody>
</table>

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>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>IAPMO PS-104-1997</td>
<td>Pressure Relief Connection for Dispensing Equipment</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)
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.
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.
Proposals

Item #: 134

UPC 2024  Section: Table 604.1, Table 1701.1

SUBMITTER: Chang Ki Lee
PlumbPlus Corp.

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>Ductile-Iron</td>
<td>X</td>
<td>X</td>
<td>AWWA C151</td>
<td>ASME B16.4, AWWA C110, AWWA C153, IAPMO IGC 360</td>
</tr>
</tbody>
</table>

(portions of table not shown remains 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>IAPMO IGC 360-2020a</td>
<td>Compression Fittings for Water Supply and Gas Piping Applications</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**Note:** IAPMO IGC 360 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 proposed standard covers compression type fitting for ductile iron water supply pipe. This type of compression fitting is currently not covered by any standard.
Proposals

Item #: 135
UPC 2024  Section: Table 604.1, Table 1701.1, Table 1701.2

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

<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>Ductile-Iron</td>
<td>X</td>
<td>X</td>
<td>AWWA C151</td>
<td>ASME B16.4, AWWA C110, AWWA C153, AWWA C606, CSA B242, IAPMO PS 53</td>
</tr>
<tr>
<td>Galvanized Steel</td>
<td>X</td>
<td>X</td>
<td>ASTM A53</td>
<td>AWWA C606, CSA B242, IAPMO PS 53</td>
</tr>
<tr>
<td>Malleable Iron</td>
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<td>X</td>
<td>—</td>
<td>ASME B16.3, AWWA C606, IAPMO PS 53</td>
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<tr>
<td>Stainless Steel</td>
<td>X</td>
<td>X</td>
<td>ASTM A269, ASTM A312, ASTM A554, ASTM A778</td>
<td>ASTM F3226, CSA B242, IAPMO PS 53, IAPMO PS 117</td>
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</tbody>
</table>

(portions of table not shown remain unchanged)
**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>AWWA C606-2015</td>
<td>Grooved and Shouldered Joints</td>
<td>Joints</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>CSA B242-2005 (R2016)</td>
<td>Groove- and Shoulder-Type Mechanical Pipe Couplings</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>IAPMO PS 53-2020</td>
<td>Grooved Mechanical Pipe Couplings and Grooved Fittings</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

**Note:** AWWA C606, CSA B242, and IAPMO PS 53 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**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWWA C606-2015</td>
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<td>Joints</td>
</tr>
<tr>
<td>CSA B242-2005 (R2016)</td>
<td>Groove- and Shoulder-Type Mechanical Pipe Couplings</td>
<td>Fittings</td>
</tr>
<tr>
<td>IAPMO PS 53-2016a</td>
<td>Grooved Mechanical Pipe Couplings and Grooved Fittings</td>
<td>Joints</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

**SUBSTANTIATION:**

These fitting standards cover grooved mechanical pipe couplings and grooved fittings for pressure applications. These types of fittings are not currently covered in the codes, but are widely used in the industry for water distribution applications.
**Proposals**

**Item #: 136**

UPC 2024  Section: Table 604.1, Table 1701.1, Table 1701.2

**SUBMITTER:** Mr John Wilson  
Taylor Kerr Engineering Ltd (Teekay Couplings)

**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>
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<tr>
<td>Ductile-Iron</td>
<td>X</td>
<td>X</td>
<td>AWWA C151</td>
<td>ASME B16.4, ASTM F1476, AWWA C110, AWWA C153</td>
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<tr>
<td>Galvanized Steel</td>
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<td>X</td>
<td>ASTM A53</td>
<td>—</td>
</tr>
<tr>
<td>PE</td>
<td>X¹</td>
<td>—</td>
<td>ASTM D2239, ASTM D2737, ASTM D3035, AWWA C901, CSA B137.1</td>
<td>ASTM D2609, ASTM D2683, ASTM D3261, ASTM F1055, ASTM F1476, CSA B137.1</td>
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<tr>
<td>PP</td>
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<td>X</td>
<td>ASTM F2389, CSA B137.11</td>
<td>ASTM F1476, ASTM F2389, CSA B137.11</td>
</tr>
</tbody>
</table>

¹ PE schedule 100.
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>
</table>

Note: ASTM F1476 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>ASTM F1476-2007 (R2013)</td>
<td>Performance of Gasketed Mechanical Couplings for Use in Piping Applications</td>
<td>Joints</td>
</tr>
</tbody>
</table>

SUBSTANTIATION:
The ASTM F1476 specification provides the performance characteristics and qualification tests required for gasketed mechanical couplings (GMC) including groove-type mechanical couplings for grooved end pipe, mechanical restraint couplings for plain end pipe and mechanical compression couplings for plain end pipe.

These couplings are for use at temperatures within the recommended temperature range of their respective gaskets.

Couplings manufactured to perform to this standard are utilized around the world for many pipework systems for civils, water, oil & gas, marine, plumbing and mechanical installations with a wide range of pipe materials. Gasketed mechanical pipe couplings allow pipes to be permanently joined without the need for welding, soldering or brazing, eliminating the need for on-site hot work. No pipe threading, grooving, or alternative preparation is required. This gives the system designer and contractor access to a widely used and accepted modern construction method in today’s industry.

Health and safety benefits come from the simple tools required and the use of plain end pipe. There is no heating, welding or manipulation of material on site, so handling is easy and safe. The coupling is light in weight, has no loose parts and all materials are REACH and RoHS compliant and manufactured under an ISO 9001 quality programme. Gaskets are NSF 61 compliant.

The high-level performance of GMCs allows gravity systems to be uprated. For example, where CISPI 310 states that thrust restraint systems are required, a GMC can fulfil the regulation. Global manufacturers of hubless cast iron utilize GMCs in sensitive locations as part of their overall systems.
Proposals

Item #: 137

UPC 2024  Section: Table 604.1, Table 1701.1

SUBMITTER: Mark Fasel
Viega LLC

RECOMMENDATION:
Revise text

<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>
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</thead>
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<tr>
<td>Stainless Steel</td>
<td>X</td>
<td>X</td>
<td>ASTM A269, ASTM A312, ASTM A554, ASTM A778</td>
<td>ASTM F3226, IAPMO IGC 353, IAPMO PS 117</td>
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<thead>
<tr>
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<th>REFERENCED SECTION</th>
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<tr>
<td>IAPMO IGC 353-2019</td>
<td>Branch Connectors</td>
<td>Connectors</td>
<td>Table 604.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: IAPMO IGC 353 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 IAPMO IGC 353 Branch Connectors standard was developed for branch connectors NPS 1 1/2" - 6 inches.

Branch connectors are defined within the standard as a permanent fitting or connection that allows a NPT threaded branch connection to be added to existing piping.

Branch connectors covered by IAPMO IGC 353 shall include:
(a) Saddle like permanent connection mechanically fixed in place to the host pipe; and
(b) leak tight seal realized through the compression of a sealing element between the outer surface of the pipe and body or flange of the branch connector.

Note: One method of mechanically fixing the branch connection is via a swaging action which secures the fitting by mechanically deforming a flange of metal attached to the branch connector so that it matches the contour of the inside surface of a host pipe as indicated in Section 1.1.2 of IAPMO IGC 353.

Section 4.2.1 of the standard requires that materials and components of a branch connector intended to convey or dispense water for human consumption through drinking or cooking shall comply with the applicable requirements of NSF/61 and the applicable low-lead requirements.
The addition of this standard to the Materials for building supply and water distribution piping and fittings table provides a consensus developed standard branch connector fittings can be listed to for use in potable water applications with stainless steel pipe.
Proposals

Item #: 138
UPC 2024  Section: Table 604.1, Table 1701.1

SUBMITTER: Michael Cudahy
PPFA

RECOMMENDATION:
Revise text

<table>
<thead>
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<th>TABLE 604.1</th>
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<tr>
<td><strong>MATERIAL</strong></td>
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<table>
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<tr>
<th>TABLE 1701.1</th>
</tr>
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<tr>
<td><strong>REFERENCED STANDARDS</strong></td>
</tr>
<tr>
<td><strong>STANDARD NUMBER</strong></td>
</tr>
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<td>-------------------</td>
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<tr>
<td>ASTM F3347-2020a</td>
</tr>
<tr>
<td>ASTM F3348-2020b</td>
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</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:
Proposals

Item #: 139
UPC 2024  Section: 604.2

SUBMITTER: Cameron Rapoport
Watts Water Technologies

RECOMMENDATION:
Revise text

604.0 Materials.

604.2 Lead Content. The maximum allowable lead content in pipes, pipe fittings, plumbing fittings, and fixtures intended to convey or dispense water for human consumption shall be not more than a weighted average of 0.25 percent with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures. For solder and flux, the lead content shall be not more than 0.2 percent where used in piping systems that convey or dispense water for human consumption.

Exceptions:
(1) Pipes, pipe fittings, plumbing fittings, or fixtures or back-flow preventers used for nonpotable services such as manufacturing, industrial processing, irrigation, outdoor watering, or any other uses where the water is not used for human consumption.

(2) Flush valves, fill valves, flushometer valves, tub fillers, shower valves, service saddles, or water distribution main gate valves that are 2 inches (50 mm) in diameter or larger.

SUBSTANTIATION:
Backflow preventers that are intended to convey water for use in non-potable services are in contact with potable water on the upstream side. Authorities Having Jurisdiction are increasingly requiring lead free backflow preventers in these applications (i.e. irrigation, fire) for this reason. This language would align with inspectors and increase water safety with respect to lead contact.
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
604.11 Flexible Corrugated Connectors. Flexible corrugated connectors of copper or stainless steel shall be limited to the following connector lengths:
- Water Heater Connectors — twenty-four inches (609 mm)
- Fixture Connectors — thirty inches (762 mm)
- Washing Machine Connectors — seventy-two inches (1827 mm)
- Dishwasher and Icemaker Connectors — one hundred twenty inches (3048 mm)

**Proponent:** P.J. Higgins & Associates, Inc.

**Reason for Code Revision:**
Working with the listees, the Plumbing Research Committee has recommended these requirements for corrugated flexible connectors. The intent of this change is to limit the length of flexible supplies to a reasonable length, which may be found in field installations, and to prevent the flexible supply from being used as a branch line.

**Code Committee’s Recommendation:**
Adopt Item 72
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 direct 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.
605.0 Joints and Connections.
605.1 Copper or Copper Alloy Pipe, Tubing, and Joints. (remaining text unchanged)

605.1.3 Mechanical Joints. Mechanical joints shall include, but are not limited to, compression, flanged, grooved, pressed, and push fit fittings.

   Mechanical joints for copper or copper alloy piping shall be made with a mechanical coupling with groove end piping, or ASTM F1476 Type II Class 2 flexible and restrained, or approved joint designed for the specific application.

605.2 CPVC Plastic Pipe and Joints. (remaining text unchanged)
605.2.1 Mechanical Joints. Mechanical joints shall include compression, flanged, grooved and push fit fittings.

   A mechanical joint shielded coupling for CPVC plastic shall have a metallic shield that complies with ASTM F1476 Type II Class 2 flexible and restrained or Type II Class 3 flexible and unstrained. The elastomeric seal shall comply with NSF/ANSI/CAN 61 or other suitable material that will cater for the effluent within the pipework system. The coupling shall be installed in accordance with manufacturer’s installation instructions. The mechanical joint shall be treated as a permanent pipe seal.

605.3 CPVC/AL/CPVC Plastic Pipe and Joints. (remaining text unchanged)
605.3.1 Solvent Cement. (remaining text unchanged)
605.3.2 Mechanical Joints. Mechanical joints shall include flanged, grooved, flexible and restrained couplings and push fit fittings.

605.4 Ductile Iron Pipe and Joints. (remaining text unchanged)
605.4.1 Mechanical Joints. Mechanical joints for ductile iron pipe and fittings shall consist of a bell that is cast integrally with the pipe or fitting and provided with an exterior flange having bolt holes and a socket with annular recesses for the sealing gasket and the plain end of the pipe or fitting. The elastomeric gasket shall comply with AWWA C111. Lubricant recommended for potable water application by the pipe manufacturer shall be applied to the gasket and plain end of the pipe.

   A mechanical joint shielded coupling for jointing ductile iron pipe should conform to ASTM F1476 Type II Class 2 flexible and restrained or Type II Class 3 flexible and unstrained, or AWWA C227 bolted split-sleeve coupling. Mechanical shields shall comply with either 304 or 316L stainless steel with alloy steel coated or 316 / 316L stainless steel fasteners. The elastomeric gasket shall comply with NSF/ANSI/CAN 61. The coupling shall be installed in accordance with manufacturer’s installation instructions.

605.5 Galvanized Steel Pipe and Joints. (remaining text unchanged)
605.5.1 Mechanical Joints. Mechanical joints shall be made with an approved and listed elastomeric gasket.

   Mechanical Joints shall be made with an elastomeric gasket or to ASTM F1476 Type II Class 2 flexible and restrained or Type II Class 3 flexible and unstrained. The elastomeric seal shall comply or shall comply with NSF/ANSI/CAN 61.
605.6 PE Plastic Pipe/Tubing and Joints. Mechanical joints between PE pipe or tubing and fittings shall include insert and mechanical compression fittings that provide a pressure seal resistance to pullout. Joints for insert fittings shall be made by cutting the pipe square, using a cutter designed for plastic piping, and removal of sharp edges. Two stainless steel clamps shall be placed over the end of the pipe. Fittings shall be checked for proper size based on the diameter of the pipe. The end of pipe shall be placed over the barbed insert fitting, making contact with the fitting shoulder. Clamps shall be positioned equal to 180 degrees (3.14 rad) apart and shall be tightened to provide a leak tight joint. Compression type couplings and fittings shall be permitted for use in joining PE piping and tubing. Stiffeners that extend beyond the clamp or nut shall be prohibited. Bends shall be not less than 30 pipe diameters, or the coil radius where bending with the coil. Bends shall not be permitted closer than 10 pipe diameters of a fitting or valve. Mechanical joints shall be designed for their intended use.

Mechanical Joints shall be made with an elastomeric gasket or to ASTM F1476 Type II Class 2 flexible and restrained or Type II Class 3 flexible and unrestrained. The elastomeric seal shall comply with NSF/ANSI/CAN 61. The coupling shall be installed in accordance with manufacturer's installation instructions.

605.11 Polypropylene (PP) Piping and Joints. Mechanical and compression sleeve joints shall be installed in accordance with the manufacturer’s installation instructions.

Mechanical Joints shall be made with an elastomeric gasket or to ASTM F1476 Type II Class 2 flexible and restrained or Type II Class 3 flexible and unrestrained. The elastomeric seal shall comply with NSF/ANSI/CAN 61. The coupling should be installed in accordance with manufacturer’s installation instructions.

605.12 PVC Plastic Pipe and Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint. The mechanical joint shall include a pipe spigot that has a wall thickness to withstand without deformation or collapse; the compressive force exerted where the fitting is tightened. The push-on joint shall have a minimum wall thickness of the bell at any point between the ring and the pipe barrel. The elastomeric gasket shall comply with ASTM D3139, and be of such size and shape as to provide a compressive force against the spigot and socket after assembly to provide a positive seal.

Mechanical gasketed couplings with stainless steel casing shield and elastomer gasket ASTM F1476 Type II Class 2 flexible and restrained or Type II Class 3 flexible and unrestrained, shall be designed for its intended use.

605.13 Stainless Steel Pipe and Joints. Mechanical joints shall be designed for their intended use. Such joints shall include compression, flanged, grooved, press-connect, and threaded.

Mechanical joints between stainless steel pipe and fittings shall be of the compression, grooved coupling, hydraulic press-connect fittings, flanged or ASTM F1476 Type II Class 2 flexible and restrained or Type II Class 3 flexible and unrestrained for plain ended pipes and fittings.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<tr>
<td>AWWA C227-2017</td>
<td>Bolted, Split-Sleeve Couplings</td>
<td>Joints</td>
<td>605.4.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)
Note: ASTM F1476, AWWA C227, and NSF/ANSI/CAN 61 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>ASTM F1476-2007(R2013)</td>
<td>Performance of Gasketed Mechanical Couplings for Use in Piping Applications</td>
<td>Joints</td>
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</tbody>
</table>

(portions of table not shown remains unchanged)

**SUBSTANTIATION:**
The ASTM F1476 specification provides the performance characteristics and qualification tests required for gasketed mechanical couplings (GMC) including groove-type mechanical couplings for grooved end pipe, mechanical restraint couplings for plain end pipe and mechanical compression couplings for plain end pipe.

These couplings are for use at temperatures within the recommended temperature range of their respective gaskets.

Couplings manufactured to perform to this standard are utilized around the world for many pipework systems for civils, water, oil & gas, marine, plumbing and mechanical installations with a wide range of pipe materials. Gasketed mechanical pipe couplings allow pipes to be permanently joined without the need for welding, soldering or brazing, eliminating the need for on-site hot work. No pipe threading, grooving, or alternative preparation is required. This gives the system designer and contractor access to a widely used and accepted modern construction method in today’s industry.

Health and safety benefits come from the simple tools required and the use of plain end pipe. There is no heating, welding or manipulation of material on site, so handling is easy and safe. The coupling is light in weight, has no loose parts and all materials are REACH and RoHS compliant and manufactured under an ISO 9001 quality programme. Gaskets are NSF 61 compliant.

The high-level performance of GMCs allows gravity systems to be uprated. For example, where CISPI 310 states that thrust restraint systems are required, a GMC can fulfil the regulation. Global manufacturers of hubless cast iron utilize GMCs in sensitive locations as part of their overall systems.
Proposals

Item #: 143
UPC 2024 Section: 605.1.3.3

SUBMITTER: Tyler Leighton
Watts Water Technologies

RECOMMENDATION:
Revise text

605.0 Joints and Connections.

605.1.3 Mechanical Joints. (remaining text unchanged)

605.1.3.3 Push Fit Fittings. Removable and nonremovable push fit fittings for copper or copper alloy tubing or pipe that employ quick assembly push fit connectors shall comply with ASSE 1061. Push fit fittings for copper or copper alloy pipe or tubing shall have an approved elastomeric o-ring that forms the joint. Pipe or tubing shall be cut square, chamfered, and reamed to full inside diameter. The tubing shall be fully inserted into the fitting, and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to ensure the tubing is inserted into the fitting and gripping mechanism has engaged on the pipe. Fittings used in potable water systems intended to supply drinking water shall comply with NSF 61.

SUBSTANTIATION:
The purpose of requiring NSF 61 and NSF 372 is to ensure the health and safety of everyone using these fittings in potable water applications. The provisions are consistent with those found in Section 604.1.
Proposals

Item #: 144

UPC 2024  Section: 605.2.2

SUBMITTER: Forest Hampton
Lubrizol, Inc.

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, green, 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. Place pipe inside fitting to forcefully bottom the pipe in the socket and hold together until joint is set.

SUBSTANTIATION:
Currently, it can be difficult to see the yellow solvent cement ring on a tan CTS CPVC joint during inspection. A high contrast cement has been asked for from the field to aid in the inspection of CPVC joints. The color green was chosen because of its high contrast against the tan pipe and fittings and green is not currently used to identify any other type of cement.
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>
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<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.”
Proposals

Item #: 146
UPC 2024  Section: 605.12

SUBMITTER: Karan Kapila
Self

RECOMMENDATION:
Revise text

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.
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 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>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>
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</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”
Proposals

Item #: 148
UPC 2024  Section: 605.16.1, 705.10.2

SUBMITTER: Pennie Feehan
Pennie L Feehan Consulting
Rep. Copper Development Association

RECOMMENDATION:
Revise text

605.0 Joints and Connections.
605.16 Joints Between Various Materials. (remaining text unchanged)

605.16.1 Copper or Copper Alloy Pipe or Tubing to Threaded Pipe Joints. Joints from copper or copper alloy pipe or tubing to threaded pipe that is not copper, or copper alloy shall be made using copper alloy adapter, copper alloy nipple [minimum 6 inches (152 mm)], dielectric fitting, or dielectric union in accordance with ASSE 1079. The joint between the copper or copper alloy pipe or tubing and the fitting shall be a soldered, brazed, flared, or press-connect joint and the connection between the threaded pipe and the fitting shall be made with a standard pipe size threaded joint.

705.0 Joints and Connections.
705.10 Joints Between Various Materials. (remaining text unchanged)

705.10.2 Copper or Copper Alloy Pipe to Threaded Pipe Joints. Joints from copper or copper alloy pipe or tubing to threaded pipe that is not copper, or copper alloy shall be made by the use of a listed copper alloy adapter or dielectric fitting. The joint between the copper or copper alloy pipe and the fitting shall be a soldered or brazed, and the connection between the threaded and the fittings shall be made with a standard pipe size threaded joint.

SUBSTANTIATION:
The original sentence of Section 605.16.1 and Section 705.10.2 is not clear and does not specify that the connection is from copper alloy pipe or tubing to threaded pipe of a different material. This proposal does not change the intent of the code section.
Proposals

Item #: 149
UPC 2024  Section: 605.15, 605.16.1, 605.16.3, Table 1701.1, Table 1701.2

SUBMITTER: Ronald Rice
self

RECOMMENDATION:
Revise text

605.0 Joints and Connections.

605.15 Dielectric Unions. Dielectric unions where installed at points of connection where there is a dissimilarity of metals shall be in accordance with ASSE 1079 or IAPMO PS 66.

605.16 Joints Between Various Materials. (remaining text unchanged)
605.16.1 Copper or Copper Alloy Pipe or Tubing to Threaded Pipe Joints. Joints from copper or copper alloy pipe or tubing to threaded pipe shall be made using copper alloy adapter, copper alloy nipple [minimum 6 inches (152 mm)], dielectric fitting, or dielectric union in accordance with ASSE 1079 or IAPMO PS 66. The joint between the copper or copper alloy pipe or tubing and the fitting shall be a soldered, brazed, flared, or press-connect joint and the connection between the threaded pipe and the fitting shall be made with a standard pipe size threaded joint.

605.16.3 Stainless Steel to Other Materials. Where connecting stainless steel pipe to other types of piping, mechanical joints of the compression type, dielectric fitting, or dielectric union in accordance with ASSE 1079 or IAPMO PS 66 and designed for the specific transition intended shall be used.

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 66-2015</td>
<td>Dielectric Fittings</td>
<td>Fittings</td>
<td>605.15, 605.16.1, 605.16.3</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: IAPMO PS 66 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 66-2015</td>
<td>Dielectric Fittings</td>
<td>Fittings</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
This standard covers insulated, dielectric fittings with male threads, grooved ends, or plain ends, intended to reduce galvanic corrosion in plumbing systems by isolating dissimilar metal piping sections, and specifies requirements for materials, physical characteristics, performance testing, and markings. IAPMO PS 66 covers larger diameter piping.
605.0 Joints and Connections.

605.16 Joints Between Various Materials. (remaining text unchanged)

605.16.2 Plastic Pipe to Other Materials. Where connecting plastic pipe to other types of piping, approved types of adapter or transition fittings designed for the specific transition intended shall be used including stepped gasketed mechanical couplings.

605.16.3 Stainless Steel to Other Materials. Where connecting stainless steel pipe to other types of piping, mechanical joints couplings of the compression type, gasketed mechanical coupling-dielectric fitting, or dielectric union in accordance with ASSE 1079 and designed for the specific transition intended shall be used.

SUBSTANTIATION:
The ASTM F1476 specification provides the performance characteristics and qualification tests required for gasketed mechanical couplings (GMC) including groove-type mechanical couplings for grooved end pipe, mechanical restraint couplings for plain end pipe and mechanical compression couplings for plain end pipe.

These couplings are for use at temperatures within the recommended temperature range of their respective gaskets.

Couplings manufactured to perform to this standard are utilized around the world for many pipework systems for civils, water, oil & gas, marine, plumbing and mechanical installations with a wide range of pipe materials. Gasketed mechanical pipe couplings allow pipes to be permanently joined without the need for welding, soldering or brazing, eliminating the need for on-site hot work. No pipe threading, grooving, or alternative preparation is required. This gives the system designer and contractor access to a widely used and accepted modern construction method in today's industry.

Health and safety benefits come from the simple tools required and the use of plain end pipe. There is no heating, welding or manipulation of material on site, so handling is easy and safe. The coupling is light in weight, has no loose parts and all materials are REACH and RoHS compliant and manufactured under an ISO 9001 quality programme. Gaskets are NSF 61 compliant.

The high-level performance of GMCs allows gravity systems to be uprated. For example, where CISPI 310 states that thrust restraint systems are required, a GMC can fulfil the regulation. Global manufacturers of hubless cast iron utilize GMCs in sensitive locations as part of their overall systems.
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>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
</table>

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.
Proposals

Item #: 152

UPC 2024  Section: 606.1, Table 1701.1

SUBMITTER: Garry Sato
Greensmart Sustainable Concepts

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 or other approved materials. 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 IGC 312, 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 carrying water intended to supply drinking water shall also comply with NSF 61.

<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 312-2018a</td>
<td>Gate, Globe, Angle, and Check Valves</td>
<td>Valves</td>
<td>606.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO IGC 312 and NSF 61 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
The proposed text cleans up the language by adding “or other approved materials” for sizes exceeding 2” as indicated in the first sentence. NSF 61 is moved after the valve standards as NSF 61 is an additional standard required for drinking water purposes. Furthermore, IAPMO IGC 312 is being added as it is an approved standard which covers ball, gate, and globe valves that are fullway/full-port type valves.
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.
Proposals

Item #: 154

UPC 2024  Section: 606.5.1, Table 1701.1, Table 1701.2

SUBMITTER: Ronald Rice

self

RECOMMENDATION:

Add new text

606.0 Valves.

606.5 Control Valve. (remaining text unchanged)

606.5.1 Manifolds. Field installed manifolds for water distribution shall conform with the applicable requirements for valves, pipes, and fittings as referenced in this code. Manufactured water distribution manifolds shall be in accordance with IAPMO IGC 109.

<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-109-2019</td>
<td>Water Distribution Manifolds</td>
<td>Valves</td>
<td>606.5.1</td>
</tr>
</tbody>
</table>

Note: IAPMO IGC 109 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-IGC-109-2017</td>
<td>Water Distribution Manifolds</td>
<td>Valves</td>
</tr>
</tbody>
</table>

SUBSTANTIATION:
Manifolds are utilized in water distribution systems. The addition of a section for manifolds will provide guidance to the end user and ensure that all components of field installed manifolds conform to the applicable material standards for water distribution. Furthermore, IAPMO IGC 109 is being added as the standard covers water distribution manifolds for residential and commercial, hot and cold, water distribution systems, and specifies requirements for materials, physical characteristics, performance testing, and markings.
Proposals

Item #: 155

UPC 2024  Section: 606.9, Table 1701.1

SUBMITTER: Cameron Rapoport
Watts Water Technologies

RECOMMENDATION:
Revise text

606.0 Valves.

606.9 Leak Detection Devices. Where digital leak detection devices for water supply and distribution are installed, they shall comply with IAPMO IGC 115 or IAPMO IGC 349 IAPMO Z1349.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO Z1349-2021</td>
<td>Devices for Detection, Monitoring or Control of Plumbing Systems</td>
<td>Miscellaneous</td>
<td>606.9</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO Z1349 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 IAPMO IGC 115 and the IAPMO IGC 349 standards have been incorporated into one standard (IAPMO Z1349) which now incorporates digital technology.
Proposals

Item #: 156

UPC 2024  Section: 606.9, L 405.1, Table 1701.1

SUBMITTER: Rich Houle
Reliance Worldwide Corporation

RECOMMENDATION:
Revise text

606.0 Valves.

606.9 Leak Detection Devices. Where leak detection devices for water supply and distribution are installed, they shall comply with IAPMO IGC 115 or IAPMO IGC 349 or IAPMO Z1349.

L 405.0 Leak Detection and Control.
L 405.1 General. Where installed, leak detection and control devices shall comply with IAPMO IGC 115 or IAPMO IGC 349 or IAPMO Z1349. Leak detection and control devices help protect property from water damage and also conserve water by shutting off the flow when leaks are detected.

TABLE 1701.1
REFERENCED STANDARDS

<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>IAPMO Z1349-2021</td>
<td>Devices for Detection, Monitoring or Control of Plumbing Systems</td>
<td>Miscellaneous</td>
<td>606.9</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO Z1349 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 standard IAPMO IGC 115 and IGC 349 have been updated and have gone through the ANSI process. Both IGC 115 and IGC 349 have been combined into one standard; ANSI/CAN/IAPMO Z1349.
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 coats, 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, 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. 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. A listed pressure-relief valve installed in accordance with the manufacturer’s installation instructions. The relief valve shall be discharged in accordance with Section 608.5.

608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.

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>ANSI/WSC PST</td>
<td>Performance Requirements for pressurized potable water storage tanks</td>
<td>Water Supply components</td>
<td>607.2.2</td>
</tr>
</tbody>
</table>

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.
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 11/2 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.
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.
Proposals

Item #: 160

UPC 2024  Section: 608.2, 608.3

SUBMITTER: David Mann
CA State Pipe Trades Council

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. 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.

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, 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.

608.3 Expansion Tanks, and Combination Temperature and Pressure-Relief Valves. A water system provided with a check valve, backflow preventer, or other normally closed device that prevents dissipation of building pressure back into the water main, independent of the type of water heater used, shall be provided with an approved, listed, and adequately sized expansion tank or other approved device having a similar function to control thermal expansion. Prepressurized water expansion tanks shall comply with IAPMO Z1088. Such expansion tank or other approved device shall be installed on the building side of the check valve, backflow preventer, or other device and shall be sized, securely fastened to the structure, and installed in accordance with the manufacturer’s installation instructions.

A water system containing storage water heating equipment shall be provided with an approved, listed, adequately sized combination temperature and pressure-relief valve, except for listed nonstorage instantaneous heaters having an inside diameter of not more than 3 inches (80 mm). Each such approved combination temperature and pressure-relief valve shall be installed on the water-heating device in an approved location based on its listing requirements and the manufacturer’s installation instructions. Each such combination temperature and pressure-relief valve shall be provided with a drain in accordance with Section 608.5.

SUBSTANTIATION:
Expansion tanks range in sizes and types. Many tanks are being left to be supported by the piping onto which it is mounted, however this is a concern as piping is not meant to be a supporting device, actually piping is required to be supported, not the other way around. The addition of this language will require that all expansion tanks be supported where the installation instructions fail to mention this.
Item #: 161
UPC 2024  Section: 608.3

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Revise text

608.3 Expansion Tanks, and Combination Temperature and Pressure-Relief Valves. A water system provided with a check valve, backflow preventer, or other normally closed device that prevents dissipation of building pressure back into the water main, independent of the type of water heater used, shall be provided with an approved, listed, and adequately sized expansion tank or other approved device having a similar function to control thermal expansion. Prepressurized water expansion tanks shall comply with IAPMO Z1088. Such expansion tank or other approved device shall be installed on the building side of the check valve, backflow preventer, or other device and shall be sized and installed in accordance with the manufacturer’s installation instructions.

A water system containing storage water heating equipment shall be provided with an approved, listed, adequately sized combination temperature and pressure-relief valve, except for listed nonstorage instantaneous heaters having an inside diameter of not more than 3 inches (80 mm). Each such approved combination temperature and pressure-relief valve shall be installed on the water-heating device in an approved location based on its listing requirements and the manufacturer’s installation instructions. Each such combination temperature and pressure-relief valve shall be provided with a drain in accordance with Section 608.5.

Exception: An expansion tank is not required for an instantaneous non-storage water heater. All other provisions of Section 608.3 still apply.

SUBSTANTIATION:
Water does not compress so when it is heated and it expands it can create damaging pressure. Expansion tanks are designed to compensate for this. Instantaneous water heaters do not store water so there is no water to expand and create the excess pressure. Water is heated on demand only so there is no issue of the water heating, expanding and building pressure as the water is flowing out by the demand.
Proposals

Item #: 162
UPC 2024  Section: 608.7

SUBMITTER: Karan Kapila
Self

RECOMMENDATION:
Revise text

608.0 Water Pressure, Pressure Regulators, Pressure Relief Valves, and Vacuum Relief Valves.

608.7 Vacuum Relief Valves. Where the elevation of an entire 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 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.
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.
Proposals

Item #: 164
UPC 2024  Section: 610.2, 611.4 – 611.4.2, Table 611.4

SUBMITTER: Jason Montgomery
JASONS WATER SYSTEMS MFG. INC.

RECOMMENDATION:
Revise text

610.0 Size of Potable Water Piping.

610.2 Pressure Loss. Where a water filter, point of entry (POE) equipment (such as water softeners, iron filters, and chlorinators), backflow prevention device, tankless water heater, or similar device is installed in a water supply line, the pressure loss through such devices shall be included in the pressure loss calculations of the system, and the water supply pipe and meter shall be adequately sized to provide for such a pressure loss. Pressure loss for residential point of entry (POE) equipment shall be determined in accordance with Section 611.4 or other approved methods.

No water filter, water softener, backflow prevention device, or similar device regulated by this code shall be installed in a potable water supply piping where the installation of such device produces an excessive pressure drop in such water supply piping. In the absence of specific pressure drop information, the diameter of the inlet or outlet of such device or its connecting piping shall be not less than the diameter of such water distribution piping to the fixtures served by the device.

Such devices shall be of a type approved by the Authority Having Jurisdiction and shall be tested for flow rating and pressure loss by an approved laboratory or recognized testing agency to standards consistent with the intent of this chapter.

611.0 Drinking Water Treatment Units.

611.4 Sizing of Residential Point of Entry Equipment Softeners. Residential-use point of entry (POE) water treatment equipment pressure drop and connection sizing for water softeners shall be sized in accordance with Table 611.4, with the following:

611.4.1 Residential Point of Entry Equipment Pressure Drop. The flow rate (gpm) of the fixtures served by the POE equipment shall be used to establish the pressure drop (psi) for pipe sizing calculations. The pressure drop shall be determined as follows:

1. Acquire manufacture specification sheet showing pressure drop (psi) versus flow rate (gpm).
2. Determine flow rate (gpm) for residential fixture groups from Table 611.4.
3. Determine pressure drop (psi) from the manufacturer’s specification sheet using the acquired flow rate (gpm). The pressure drop for a water softener shall not be greater than 15 psi.

611.4.2 Residential Point of Entry Equipment Connection Sizing. The pressure drop from Section 611.4.1 shall be included with Section 610.0 to size the equipment piping.

<table>
<thead>
<tr>
<th>FIXTURE GROUPS</th>
<th>FLOW RATE (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One half bathroom plus other fixtures</td>
<td>9</td>
</tr>
<tr>
<td>One bathroom group plus other fixtures</td>
<td>9</td>
</tr>
<tr>
<td>Two to four bathroom groups plus other fixtures</td>
<td>11</td>
</tr>
</tbody>
</table>

TABLE 611.4
FLOW RATE FOR RESIDENTIAL FIXTURE GROUPS

207
Notes:
(1) Other fixtures may include: kitchen sink, dishwasher, clothes washer, and laundry sink.
(2) Table 611.4 does not include hose bibb, high flow fixtures, or hydrant flow rates.
(3) For alternate methods of calculating the flow rate (gpm), see also Appendix A, Recommended Rules for Sizing the Water Supply System, Appendix C, Alternate Plumbing Systems, and Appendix M, Peak Water Demand Calculator for alternate methods of sizing water supply systems.

### TABLE 611.4

<table>
<thead>
<tr>
<th>REQUIRED SIZE OF SOFTENER CONNECTION (inches)</th>
<th>NUMBER OF BATHROOM GROUPS SERVED¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>¾</td>
<td>up to 22</td>
</tr>
<tr>
<td>1</td>
<td>up to 43</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm

Notes:
1. Installation of a kitchen sink and dishwasher, laundry tray, and automatic clothes washer permitted without additional size increase.
2. An additional water closet and lavatory permitted.
3. Over four bathroom groups, the softener size shall be engineered for the specific installation.
4. See also Appendix A, Recommended Rules for Sizing the Water Supply System, and Appendix C, Alternate Plumbing Systems, for alternate methods of sizing water supply systems.

SUBSTANTIATION:
Using this Table 611.4 and the current method of sizing water distribution piping found in Chapter 6 (Not including the Appendices as it is not always adopted by the AHJ), it was able to be determined that Table 611.4 alone, cannot be used when determining the pipe size.

Supporting document(s) has been provided to the Technical Committee for review.

Residential Sizing for Point of Entry (POE) Water Treatment Equipment (WTE)

In order to determine pipe size, the code requires determining the pressure loss through the water treatment equipment. The following table values were generated based on the fixtures associated with UPC Table 611.4 and the Water Demand Calculator. This new table allows the end user to use GPM that will be required by the manufacturer to determine pressure loss.

<table>
<thead>
<tr>
<th>FIXTURE GROUPS ¹</th>
<th>FLOW RATE (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One half bathroom plus other fixtures</td>
<td>9</td>
</tr>
<tr>
<td>One bathroom group plus other fixtures</td>
<td>9</td>
</tr>
<tr>
<td>Two to four bathroom groups plus other fixtures</td>
<td>11</td>
</tr>
</tbody>
</table>

Notes:
(1) Other fixtures may include: kitchen sink, dishwasher, clothes washer, and laundry sink.
(2) Table 611.4 does not include hose bibb, high flow fixtures, or hydrant flow rates.
(3) For alternate methods of calculating the flow rate (gpm), see also Appendix A, Recommended Rules for Sizing the Water Supply System, Appendix C, Alternate Plumbing Systems, and Appendix M, Peak Water Demand Calculator for alternate methods of sizing water supply systems.

Available water pressure, elevation, developed length, meter size, service size, and pressure loss through the water treatment devices "must be considered" to properly size the system when using the table method in Chapter 6. To do this, the designer must have the gallon per minute (gpm) flow rate of the fixtures flowing through the device. The gpm can then be compared against the manufacturer’s device or assemblies pressure loss information. This pressure must then be subtracted from the available pressure to determine pipe sizes. Now that the ASSE 1087 standard is included in the UPC, it can be used to determine the pressure drop vs. flow rate information for all water filtration systems, residential and commercial.
If we stayed in line with the basic concept of Table 611.4, we could conclude that for residential applications, the code addresses homes with 1 – 4 bathroom groups. More than 4 bathroom groups, Note 3 of Table 611.4, indicates that more than 4 bathroom groups shall be an engineered system.

Note 1 – Indicates that the following fixtures can be included without increasing pipe sizes when using this table:
• Kitchen Sink
• Dishwasher
• Laundry Tray
• Automatic Clothes Washer

Note 2 – Indicates the following fixtures may also be included when using this table for sizing:
• Water Closet
• Lavatory
> (These fixtures combined are often referred to a ½ Bath)

The IAPMO Water Demand Calculator (WDC) was used to determine the gallons per minute (GPM) for Single Family Residential and Multi-Family Dwellings. Using the IAPMO – WDC, the following was determined: (Note: WDC does not require the input of Fixture Units to determine GPM)

<table>
<thead>
<tr>
<th>Fixtures Groups</th>
<th>Fixture</th>
<th>Enter Total Number of Fixtures</th>
<th>Probability of Use (%)</th>
<th>Enter fixture flow rate (gpm)</th>
<th>Maximum recommended fixture flow rate (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathroom Fixtures</td>
<td>Bathtub (no shower)</td>
<td>0</td>
<td>1.00</td>
<td>5.5</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>Shower</td>
<td>0</td>
<td>2.83</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Combination bath/shower</td>
<td>0</td>
<td>3.50</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td></td>
<td>Water closet, 1.25 gal</td>
<td>0</td>
<td>1.00</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Dishwasher</td>
<td>0</td>
<td>2.83</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Laundry tray</td>
<td>0</td>
<td>2.83</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Automatic clothes washer</td>
<td>0</td>
<td>1.00</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Water closet, 1-2 gal</td>
<td>0</td>
<td>1.00</td>
<td>2.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

The IAPMO Water Demand Calculator (WDC v2.0)

<table>
<thead>
<tr>
<th>Fixture Groups</th>
<th>Fixture Units</th>
<th>GPM/WDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathroom Groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Single Bath)</td>
<td>7.5</td>
<td>7.0 gpm</td>
</tr>
<tr>
<td>(Bath and ½)</td>
<td>(7.5+3.5) = 11.0</td>
<td>8.5 gpm</td>
</tr>
<tr>
<td>(2 Bath)</td>
<td>15</td>
<td>11.0 gpm</td>
</tr>
<tr>
<td>(2.5 Bath)</td>
<td>(15+3.5) =18.5</td>
<td>11.0 gpm</td>
</tr>
<tr>
<td>(3 bath)</td>
<td>22.5</td>
<td>11.0 gpm</td>
</tr>
<tr>
<td>(4 Bath)</td>
<td>30.0</td>
<td>11.0 gpm</td>
</tr>
<tr>
<td>Other Fixtures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kitchen Sink</td>
<td>1.5</td>
<td>2.2 gpm (Indiv.)</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>1.5</td>
<td>1.3 gpm (Indiv.)</td>
</tr>
<tr>
<td>Clothes Washer</td>
<td>4.0</td>
<td>3.5 gpm (Indiv.)</td>
</tr>
<tr>
<td>Laundry Sink</td>
<td>1.5</td>
<td>2.0 gpm (Indiv.)</td>
</tr>
</tbody>
</table>

Total 7.5 5.7 gpm (Combined)

It can then be concluded that if we “combined the fixtures” together, as the notes currently permit per Table 611.4, the following would apply:
As you can see in the list above, the gallons per minute (GPM) fall within either 9 gpm or 11 gpm which are the values stated in the new Table 611.4.

Supporting document(s) has been provided to the Technical Committee for review.

<table>
<thead>
<tr>
<th>Combined Fixtures</th>
<th>Fixture Units</th>
<th>GPM/WDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Bath/Other Fixtures</td>
<td>14.5</td>
<td>9.0 gpm</td>
</tr>
<tr>
<td>Bath and ½/Other Fixtures</td>
<td>18</td>
<td>9.0 gpm</td>
</tr>
<tr>
<td>2 Bath/Other Fixtures</td>
<td>22</td>
<td>11.0 gpm</td>
</tr>
<tr>
<td>2.5 Bath/Other Fixtures</td>
<td>25.5</td>
<td>11.0 gpm</td>
</tr>
<tr>
<td>3 Bath/Other Fixtures</td>
<td>29.5</td>
<td>11.0 gpm</td>
</tr>
<tr>
<td>4 Bath/Other Fixtures</td>
<td>37.5</td>
<td>11.0 gpm</td>
</tr>
</tbody>
</table>
### TABLE 610.3
WATER SUPPLY FIXTURE UNITS (WSFU) AND MINIMUM FIXTURE BRANCH PIPE SIZES

<table>
<thead>
<tr>
<th>APPLIANCES, APPURTENANCES OR FIXTURES$^2$</th>
<th>MINIMUM FIXTURE BRANCH PIPE SIZE$^{1,4}$ (inches)</th>
<th>PRIVATE</th>
<th>PUBLIC</th>
<th>ASSEMBLY$^6$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathtub or Combination</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bath/Shower (fill)$^9$</td>
<td>1/2</td>
<td>4.0</td>
<td>4.0</td>
<td>—</td>
</tr>
<tr>
<td>3/4 inch Bathtub Fill Valve$^9$</td>
<td>3/4</td>
<td>10.0</td>
<td>10.0</td>
<td>—</td>
</tr>
<tr>
<td>Bidet$^9$</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, domestic$^9$</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$^8$</td>
<td>1/2</td>
<td>1.0</td>
<td>1.0</td>
<td>—</td>
</tr>
<tr>
<td>Lavatory$^9$</td>
<td>1/2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Lawn Sprinkler, each head$^5$</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>Bar$^9$</td>
<td>1/2</td>
<td>1.0</td>
<td>2.0</td>
<td>—</td>
</tr>
<tr>
<td>Clinical Faucet</td>
<td>1/2</td>
<td>—</td>
<td>3.0</td>
<td>—</td>
</tr>
<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 dishwasher$^9$</td>
<td>1/2</td>
<td>1.5</td>
<td>1.5</td>
<td>—</td>
</tr>
<tr>
<td>Laundry$^9$</td>
<td>1/2</td>
<td>1.5</td>
<td>1.5</td>
<td>—</td>
</tr>
<tr>
<td>Service or Mop Basin$^9$</td>
<td>1/2</td>
<td>1.5</td>
<td>3.0</td>
<td>—</td>
</tr>
<tr>
<td>Washup, each set of faucets$^9$</td>
<td>1/2</td>
<td>—</td>
<td>2.0</td>
<td>—</td>
</tr>
<tr>
<td>Shower, per head$^9$</td>
<td>1/2</td>
<td>2.0</td>
<td>2.0</td>
<td>—</td>
</tr>
<tr>
<td>Urinal, 1.0 GPF Flushometer</td>
<td>3/4</td>
<td>See Footnote$^7$</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

$^1$ Table 610.3 will not be applied to bar, kitchen, or lavatory fixtures unless the fixture function is associated with medical practice.

$^2$ Public agencies and institutions (including those营利机构) may select a fixture minimum branch pipe size that is larger than the minimum listed.

$^3$ Minimum branch pipe size required to carry the fixture load of the fixture or fixtures indicated.

$^4$ Only one fixture or one set of faucets is allowed per fixture branch pipe.

$^5$ Includes outdoor devices.

$^6$ Minimum branch pipe size required to carry the fixture load of the fixture or fixtures indicated.

$^7$ Footnote: Minimum branch pipe size required to carry the fixture load of the fixture or fixtures indicated.

$^8$ Minimum branch pipe size required to carry the fixture load of the fixture or fixtures indicated.

$^9$ Minimum branch pipe size required to carry the fixture load of the fixture or fixtures indicated.
<table>
<thead>
<tr>
<th>Valve</th>
<th>Size</th>
<th>See Footnote⁷</th>
<th>—</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinal, greater than 1.0 GPF</td>
<td>3/4</td>
<td>See Footnote⁷</td>
<td>—</td>
</tr>
<tr>
<td>Flushometer Valve</td>
<td></td>
<td></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 Tank⁸</td>
<td>1/2</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Water Closet, 1.6 GPF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flushometer Tank</td>
<td>1/2</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Water Closet, 1.6 GPF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flushometer Valve ¹</td>
<td>1</td>
<td>See Footnote⁷</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</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flushometer Valve</td>
<td>1</td>
<td></td>
<td>See Footnote⁷</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 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.
TABLE 610.3
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 SIZE¹,⁴ (inches)</th>
<th>PRIVATE</th>
<th>PUBLIC</th>
<th>ASSEMBLY⁶</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonwater Urinal with Drain Cleansing Action</td>
<td>½</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
Add “nonwater” to correlate with other sections of this type of urinals. The "Nonwater Urinal with Drain Cleansing Action" term is already in Table 701.2, the definition, and other sections of the UPC.
Proposals

Item #: 167
UPC 2024 Section: 701.2, 701.3.3, 701.8, Table 1701.1

SUBMITTER: Todd Grayson
Crushproof Tubing Co

RECOMMENDATION:
Revise text

701.0 General.

701.2 Drainage Piping. Materials for drainage piping shall be in accordance with one of the referenced standards in Table 701.2 except that:

(1) No galvanized wrought-iron or galvanized steel pipe shall be used underground and shall be kept not less than 6 inches (152 mm) aboveground.

(2) ABS and PVC DWV piping installations shall be installed in accordance with applicable standards referenced in Table 701.2 and Chapter 14 “Firestop Protection.” Except for individual single-family dwelling units, materials exposed within ducts or plenums shall 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. Plastic piping installed in plenums shall be tested in accordance with all requirements of ASTM E84 or UL 723. Mounting methods, supports, and sample sizes of materials for testing that are not specified in ASTM E84 or UL 723 shall be prohibited.

(3) No vitrified clay pipe or fittings shall be used aboveground or where pressurized by a pump or ejector. They shall be kept not less than 12 inches (305 mm) belowground.

(4) Copper or copper alloy tube for drainage and vent piping shall have a weight of not less than that of copper or copper alloy drainage tube type DWV.

(5) Stainless steel 304 pipe and fittings shall not be installed underground and shall be kept not less than 6 inches (152 mm) aboveground.

(6) Cast-iron soil pipe and fittings and the stainless steel couplings used to join these products shall be listed and tested in accordance with standards referenced in Table 701.2. Such pipe and fittings shall be marked with the country of origin, manufacturer’s name or registered trademark as defined in the product standards, the third party certifier’s mark, and the class of the pipe or fitting.

(7) Flexible trap assemblies meeting the IAPMO IGC 361 listing are permissible for all applications in Table 702.1 where the trap is directly accessible.

701.3.3 Type. Fittings used for drainage shall be of the drainage type, have a smooth interior water-way except for Section 701.2 (7) applications, and be constructed to allow 1/4 inch per foot (20.8 mm/m) grade.

701.8 Disinfection. Drainage pipe between a water fixture and trap should be disinfected as necessary using Centers for Disease Control guidelines to help prevent the spread of infectious diseases that can live in these areas. Drain applications in clinical settings shall use a trap system that allows for regular disinfection.

<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 361-2019</td>
<td>Continuous Flexible Self-Plunging Waste Pipes</td>
<td>Piping</td>
<td>701.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)
Note: IAPMO IGC 361 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 viability of any material or design should be based on meeting the health, safety, and performance requirements for the application. In that respect, the current code is unnecessarily biased against flexible drain pipes in open/exposed applications where there is no risk of pervasive flooding/leaking/damage and access for repair or replacement is convenient. So if the material and design are doing the job as required by the Code and there's little risk, why inhibit the development of new products?

To that end, there are some health and performance issues with existing tailpipe and trap standards that are not being solved with hard pipe, so innovation is badly needed. The most significant example is the ability of viruses and bacteria to live (and in the case of bacteria, multiply) inside the tailpipe and trap when both are functioning as the current Code intends, and then migrate out via normal air exchanges into living space. The COVID-19 outbreak has made the dangers of airborne pathogens all that much more clear, and turning on the HVAC system in your home is like making your sink sneeze on you. Whereas a drain pipe made of soft material can be clamped off to allow for fast and easy disinfection because the entire system can be filled with a dilute bleach solution and allowed to soak, it is much harder for that kind of contact time with a rigid, open-ended system like plastic pipes create today.

Homeowners should be allowed to decide if and when they disinfect their drains, but clinical settings like hospitals would certainly benefit from a regular disinfection regimen, such as when they move a patient out of a room. In that respect, it may actually make sense for health care officials to mandate disinfection in clinical settings in the future. It would therefore be helpful to require new installations in clinical settings to allow for some method of easy and cost-effective disinfection. If we all recognize the dangers of sewer gases to disease spread, why are we ignoring those same pathogens coming up from the exposed pipe surfaces between the faucet and trap?

Other benefits include:
--Flexible pipes are able to be snaked without the risk of breaking the seal on a joint and can be bumped through normal use without the same leak potential.
--Some flexible systems could also meet ADA requirements because they wouldn't hurt knees/legs if someone in a wheelchair uses the sink.
--Regular clog/cleaning maintenance is easier with a flexible system.
--There can be fewer leak points.
--A soft polymer like rubber can create superior seals when compared to plastic-on-plastic.
--Softer materials could be freeze-proof for some outdoor or seasonal applications like public restrooms or campgrounds.
--Help to eliminate the use of hard plastic accordion pipes to solve out-of-alignment applications. This could take a known problem and replace it with a better performing product.
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>

(ports 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).
Proposals

Item #: 169
UPC 2024  Section: Table 701.2, Table 1701.1, Table 1701.2

SUBMITTER: Riley Dvorak
Forterra

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>Reinforced Concrete Pipe (RCP)</td>
<td>=</td>
<td>=</td>
<td>X</td>
<td>ASTM C76</td>
<td>ASTM C443, ASTM C923</td>
</tr>
<tr>
<td>Corrugated High Density Polyethylene (HDPE) Pipe</td>
<td>=</td>
<td>=</td>
<td>X</td>
<td>ASTM F2306</td>
<td>ASTM D3212, ASTM F2510</td>
</tr>
<tr>
<td>Corrugated Polypropylene (PP) Pipe</td>
<td>=</td>
<td>=</td>
<td>X</td>
<td>ASTM F2764</td>
<td>ASTM D3212, ASTM F2510</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

### 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>ASTM C76-2020</td>
<td>Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe</td>
<td>Piping</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM C443-2020</td>
<td>Joints for Concrete Pipe and Manholes, Using Rubber Gaskets</td>
<td>Fittings</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM C923/C923M-2020</td>
<td>Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals</td>
<td>Fittings</td>
<td>Table 701.2</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>Piping, Plastic</td>
<td>Table 701.2</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>ASTM C443-2012</td>
<td>Joints for Concrete Pipe and Manholes, Using Rubber Gaskets</td>
<td>Joints</td>
<td></td>
</tr>
<tr>
<td>(R2017)</td>
<td></td>
<td></td>
<td></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>
<td></td>
</tr>
</tbody>
</table>

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.

SUBSTANTIATION:
Currently Reinforced Concrete Pipe (RCP) and corrugated plastic products such as HDPE and PP are commonly used for storm drainage on sites within the jurisdiction of the plumbing code (ie. within 10 feet of the building or 10 feet of a watermain). In these situations, since the pipe is not listed in the table these products currently must receive special approval causing extra work for designers, owners, and plumbing code enforcers. Adding these products into the table will save time for all parties involved.

Supporting document(s) has been provided to the Technical Committee for review.
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.
### 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(^1)</td>
<td>ASME A112.4.4, ASTM D2661, ASTM D2680(^1)</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(^1)</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(^1) ASTM F794(^1), ASTM F1866</td>
</tr>
<tr>
<td>Polyethylene</td>
<td>---</td>
<td>---</td>
<td>X</td>
<td>ASTM F714, ASTM F894, ASTM F2306(^2)</td>
<td>ASTM F3202</td>
</tr>
<tr>
<td>Polypropylene</td>
<td>---</td>
<td>---</td>
<td>X</td>
<td>ASTM F2764, ASTM F2881(^2)</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(^1)</td>
<td>ASME A112.4.4, ASTM D2665, ASTM F794(^1), ASTM F1866</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 705.5.4-3-705.5.2.

---

**SUBMITTER:** Bryan Andrew Miko, P.E.
Advanced Drainage Systems, Inc.

**RECOMMENDATION:**
Revise text.
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.

705.9 705.11 Special Joints. (remaining text unchanged)

705.10 705.12 Joints Between Various Materials. (remaining text unchanged)

<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>ASTM C76-2020</td>
<td>Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe</td>
</tr>
<tr>
<td>ASTM C1628-2019</td>
<td>Joints for Concrete Gravity Flow Sewer Pipe, Using Rubber Gaskets</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>
</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>
</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>
</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>
</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.

<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 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>
</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.
Proposals

Item #: 172

UPC 2024  Section: Table 701.2, Table 1701.1, Table 1701.2

SUBMITTER: Jason John Walton
Pan-Pacific Mechanical

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>Galvanized Malleable Iron</td>
<td>—</td>
<td>X</td>
<td>—</td>
<td>ASME A112.3.1, ASTM A240, ASTM A351, ASTM A403, ASTM A743, ASTM A774, ASTM A960</td>
<td>—</td>
</tr>
<tr>
<td>Stainless Steel 304</td>
<td>—</td>
<td>X</td>
<td>—</td>
<td>ASME A112.3.1, ASTM A312</td>
<td>ASME A240, ASTM A351, ASTM A403, ASTM A743, ASTM A774, ASTM A960</td>
</tr>
<tr>
<td>Stainless Steel 306</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM A312</td>
<td>ASTM A240, ASTM A351, ASTM A403, ASTM A743, ASTM A774, ASTM A960</td>
</tr>
<tr>
<td>Stainless Steel 316L</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASME A112.3.1, ASTM A312</td>
<td>ASME A240, ASTM A351, ASTM A403, ASTM A743, ASTM A774, ASTM A960</td>
</tr>
</tbody>
</table>

* For building sewer applications.

(portions of table not shown remain unchanged)
TABLE 1701.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM A47/A47M-1999(R2018)e1</td>
<td>Ferritic Malleable Iron Castings</td>
</tr>
<tr>
<td>ASTM A240/A240M-2020a</td>
<td>Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications</td>
</tr>
<tr>
<td>ASTM A351/A351M-2018e1</td>
<td>Castings, Austenitic, for Pressure-Containing Parts</td>
</tr>
<tr>
<td>ASTM A536-1984(R2019)e1</td>
<td>Ductile Iron Castings</td>
</tr>
<tr>
<td>ASTM A774/A774M-2014(R2019)</td>
<td>As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures</td>
</tr>
<tr>
<td>ASTM A960-2020</td>
<td>Common Requirements for Wrought Steel Piping Fittings</td>
</tr>
</tbody>
</table>

(partial table not shown remain unchanged)


TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM A536-1984(R2014)</td>
<td>Ductile Iron Castings</td>
</tr>
</tbody>
</table>

(partial table not shown remain unchanged)

SUBSTANTIATION:
Table 701.2 does not adequately cover the materials that are commonly used in commercial drainage. Section 710.4 and Section 710.7 require products that are not covered by Table 701.2.

ASME B16.22 and ASME B16.51 fittings are commonly used for trap primers, condensate, indirect waste, and underground pumped discharge.

ASTM A47 and ASTM A536 fittings are commonly used for pumped discharge.

ASTM A312 pipe and ASTM A240, ASTM A351, ASTM A403, ASTM A743, ASTM A774, ASTM A960 fittings are sometimes used for pumped discharge and storm drain/ rainwater harvesting.

Supporting document(s) has been provided to the Technical Committee for review.
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</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</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.
Proposals

Item #: 174
UPC 2024  Section: Table 701.2, Table 1701.1, Table 1701.2

SUBMITTER: Mr John Wilson
Taylor Kerr Engineering Ltd (Teekay Couplings)

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>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*, ASTM F1476</td>
</tr>
<tr>
<td>Cast-Iron</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM A74, ASTM A888, CISPI 301</td>
<td>ASME B16.12, ASTM A74, ASTM A888, ASTM F1476, CISPI 301</td>
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<tr>
<td>Co-Extruded ABS (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*, ASTM F1476</td>
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<tr>
<td>Co-Extruded Composite (Schedule 40)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>ASTM F1488</td>
<td>ASME A112.4.4, ASTM D2661, ASTM D2680*, ASTM F1476</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*, ASTM F1476, ASTM F1866</td>
</tr>
<tr>
<td>Galvanized Malleable Iron</td>
<td>—</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>ASME B16.3, ASTM F1476</td>
</tr>
<tr>
<td>Galvanized Steel</td>
<td>—</td>
<td>X</td>
<td>—</td>
<td>—</td>
<td>ASTM A53, ASTM F1476</td>
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<tr>
<td>Material</td>
<td>Standards</td>
<td>Application</td>
<td>Referenced Section</td>
<td></td>
<td></td>
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<td>-----------------------------------------</td>
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<tr>
<td>Polyethylene</td>
<td>ASTM F714, ASTM F894</td>
<td>X</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ASTM F1476</td>
<td>X</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVC (Schedule 40)</td>
<td>ASTM D1785, ASTM D2665, ASTM F794*</td>
<td>X</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ASME A112.4.4, ASTM D2665, ASTM F794*</td>
<td>X</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ASTM F1476</td>
<td>X</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ASTM F894*</td>
<td>X</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVC (Sewer and Drain)</td>
<td>ASTM D2729, ASTM F1476</td>
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</tr>
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<td></td>
<td>ASTM D2729, ASTM F1476</td>
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<td>—</td>
<td></td>
<td></td>
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<tr>
<td>PVC PSM</td>
<td>ASTM D3034</td>
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<td>—</td>
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<td></td>
<td>ASTM D3034, ASTM F1476</td>
<td>X</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stainless Steel 304</td>
<td>ASME A112.3.1</td>
<td>X</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stainless Steel 316L</td>
<td>ASME A112.3.1</td>
<td>X</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitrified Clay (Extra strength)</td>
<td>ASTM C700</td>
<td>X</td>
<td>—</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>ASTM C700, ASTM F1476</td>
<td>X</td>
<td>—</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* For building sewer applications.

### 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 F1476-2007</td>
<td>Performance of Gasketed Mechanical Couplings for Use in Piping Applications</td>
<td>Joints</td>
<td>Table 701.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

**Note:** ASTM F1476 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>ASTM F1476-2007</td>
<td>Performance of Gasketed Mechanical Couplings for Use in Piping Applications</td>
<td>Joints</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

**SUBSTANTIATION:**

The ASTM F1476 specification provides the performance characteristics and qualification tests required for gasketed mechanical couplings (GMC) including groove-type mechanical couplings for grooved end pipe, mechanical restraint couplings for plain end pipe and mechanical compression couplings for plain end pipe.

These couplings are for use at temperatures within the recommended temperature range of their respective gaskets.

Couplings manufactured to perform to this standard are utilized around the world for many pipework systems for civils, water, oil & gas, marine, plumbing and mechanical installations with a wide range of pipe materials. Gasketed mechanical pipe couplings allow pipes to be permanently joined without the need for welding, soldering or brazing, eliminating the need for on-site hot work. No pipe threading, grooving, or alternative preparation is required. This gives the system designer and contractor access to a widely used and accepted modern construction method in today’s industry.

Health and safety benefits come from the simple tools required and the use of plain end pipe. There is no heating, welding or manipulation of material on site, so handling is easy and safe. The coupling is light in weight, has no loose parts and all materials are REACH and RoHS compliant and manufactured under an ISO 9001 quality programme. Gaskets are NSF 61 compliant.
The high-level performance of GMCs allows gravity systems to be uprated. For example, where CISPI 310 states that thrust restraint systems are required, a GMC can fulfil the regulation. Global manufacturers of hubless cast iron utilize GMCs in sensitive locations as part of their overall systems.
Proposals

Item #: 175
UPC 2024 Section: 204.0, Table 702.1

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

RECOMMENDATION:
Revise text

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 702.1
**DRAINAGE FIXTURE UNIT VALUES (DFU)**

<table>
<thead>
<tr>
<th>PLUMBING APPLIANCES, APPURTEANCES, OR FIXTURES</th>
<th>MINIMUM SIZE TRAP AND TRAP ARM (inches)</th>
<th>PRIVATE</th>
<th>PUBLIC</th>
<th>PUBLIC ASSEMBLY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathroom Group (1.6 gpf or less water closet)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Half Group</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1 Bathroom Group</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1-1/2 Bathroom Groups</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2 Bathroom Groups</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2-1/2 Bathroom Groups</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3 Bathroom Groups</td>
<td>-</td>
<td>-</td>
<td>-</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>-</td>
<td>-</td>
</tr>
<tr>
<td>1 Bathroom Group</td>
<td>-</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1-1/2 Bathroom Groups</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2 Bathroom Groups</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2-1/2 Bathroom Groups</td>
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<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3 Bathroom Groups</td>
<td>-</td>
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<td>-</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>
</tbody>
</table>

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).
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.
Proposals

Item #: 176
UPC 2024  Section: 705.1.1, 705.2.2, 705.3.2, 705.4.1, 705.5.2, 705.6.1, 705.7.1, 705.8.1, 705.10.1, Table 1701.1, Table 1701.2

SUBMITTER: Mr John Wilson
Taylor Kerr Engineering Ltd (Teekay Couplings)

RECOMMENDATION:
Revise text

705.0 Joints and Connections.
705.1 ABS and ABS Co-Extruded Plastic Pipe and Joints. (remaining text unchanged)
705.1.1 Mechanical Joints. Mechanical joints shall be designed to provide a permanent seal and shall be of the mechanical or push-on joint. 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.

A mechanical joint shielded coupling for joining ABS and ABS co-extruded plastic pipe shall comply with ASTM F1476 Type II Class 2 flexible and restrained or Type II Class 3 flexible and unstrained. The mechanical shield shall comply with either 304 or 316L stainless steel with alloy steel coated or 316 / 316L stainless steel fasteners. The coupling shall be installed in accordance with manufacturer's installation instructions.

705.2 Cast-Iron Pipe and Joints. (remaining text unchanged)

705.2.2 Mechanical Joints and Compression Joints. Mechanical joints for cast-iron pipe and fittings shall be of the elastomer compression type or mechanical joint couplings. Compression type joints with an elastomeric gasket for cast-iron hub and spigot pipe shall comply with ASTM C564 and be tested in accordance with ASTM C1563. Hub and spigot shall be clean and free of dirt, mud, sand, and foreign materials. Cut pipe shall be free from sharp edges. Fold and insert gasket into the hub. Lubricate the joint following manufacturer’s instructions. Insert spigot into hub until the spigot end of the pipe bottom out in the hub. Use the same procedure for the installation of fittings.

A mechanical joint shielded coupling for joining ABS and ABS co-extruded plastic pipe shall comply with ASTM F1476 Type II Class 2 flexible and restrained or Type II Class 3 flexible and unstrained. The mechanical shield shall comply with either 304 or 316L stainless steel with alloy steel coated or 316 / 316L stainless steel fasteners. The coupling shall be installed in accordance with manufacturer's installation instructions.

705.3 Copper or Copper Alloy Pipe (DWV) and Joints. (remaining text unchanged)

705.3.2 Mechanical Joints. Mechanical joints in copper or copper alloy piping shall be made with a mechanical coupling with grooved end piping or approved joint designed for the specific application.

Mechanical joints for copper or copper alloy piping shall be made with a mechanical coupling with groove end piping, or ASTM F1476 Type II Class 2 flexible and restrained, or approved joint designed for the specific application.
705.4 Galvanized Steel Pipe and Joints. (remaining text unchanged)

705.4.1 Mechanical Joints. Mechanical joints shall be made with an elastomeric gasket. Mechanical joints shall be made with an elastomeric gasket or to ASTM F1476 Type II Class 2 flexible and restrained or Type II Class 3 flexible and un-strained.

705.5 Polyethylene (PE) Sewer Pipe. (remaining text unchanged)

705.5.2 Mechanical Joints. A mechanical joint shielded coupling for polyethylene pipe and fittings shall have a metallic shield that complies with ASTM F1476 Type II Class 3 flexible and unstrained. The coupling shall be installed in accordance with manufacturer’s installation instructions.

705.6 PVC and PVC Co-Extruded Plastic Pipe and Joining Methods. (remaining text unchanged)

705.6.1 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.

A mechanical joint shielded coupling for PVC and co-extruded plastic shall have a metallic shield that complies with ASTM F1476 Type II Class 2 flexible and restrained or Type II Class 3 flexible and unstrained. The coupling shall be installed in accordance with manufacturer’s installation instructions. The mechanical joint shall be treated as a permanent pipe seal and not a temporary pipe joint.

705.7 Stainless Steel Pipe and Joints. (remaining text unchanged)

705.7.1 Mechanical Joints. Mechanical joints between stainless steel pipe and fittings shall be of the compression, grooved coupling, hydraulic press-connect fittings, or flanged.

Mechanical Joints between stainless steel pipe and fittings shall be of the compression, grooved coupling, hydraulic press-connect fittings, flanged or ASTM F1476 Type II Class 2 flexible & restrained or Type II class 3 flexible and un-restrained. The push on joint shall include an elastomeric gasket that complies with ASTM C425 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

705.8 Vitrified Clay Pipe and Joints. (remaining text unchanged)

705.8.1 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 C425 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

Mechanical Joints shall be designed to provide a permanent seal and be of the mechanical or push fit type of joint or ASTM F1476 Type II Class 3 flexible and un-restrained. The push on joint shall include an elastomeric gasket that complies with ASTM C425 and shall provide a compressive force against the spigot and socket after assembly to provide a permanent seal.

705.10 Joints Between Various Materials. Joints between various materials shall be installed in accordance with the manufacturer’s installation instructions and guidelines and with Section 705.10.1 through Section 705.10.4. Mechanical couplings used to join different materials shall comply with ASTM C1173 for belowground use, or ASTM C1460 for aboveground use, or ASTM C1461 for aboveground and or ASTM C1461 or ASTM F1476 Type II Class 3 flexible and unrestrained for both aboveground or belowground use.

705.10.1 Copper or Copper Alloy Pipe to Cast-Iron Pipe. Joints from copper or copper alloy pipe or tubing to cast-iron pipe shall be made with a listed compression-type joint or copper alloy ferrule or stepped mechanical coupling that complies with ASTM F1476 Type II Class 3 flexible and unrestrained. The copper or copper alloy pipe or tubing shall be soldered or brazed to the ferrule, and the ferrule shall be joined to the cast iron hub by a compression or caulked joint.
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 F1476-2007(R2019)</td>
<td>Performance of Gasketed Mechanical Couplings for Use in Piping Applications</td>
<td>Joints</td>
<td>705.1.1, 705.2.2, 705.3.2, 705.4.1, 705.5.2, 705.6.1, 705.7.1, 705.8.1, 705.10.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: ASTM A1056, ASTM C425, ASTM C564, ASTM C1277, ASTM C1461, ASTM C1540, ASTM F1476, 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.

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 F1476-2007(R2013)</td>
<td>Performance of Gasketed Mechanical Couplings for Use in Piping Applications</td>
<td>Joints</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
The ASTM F1476 specification provides the performance characteristics and qualification tests required for gasketed mechanical couplings (GMC) including groove-type mechanical couplings for grooved end pipe, mechanical restraint couplings for plain end pipe and mechanical compression couplings for plain end pipe.

These couplings are for use at temperatures within the recommended temperature range of their respective gaskets.

Couplings manufactured to perform to this standard are utilized around the world for many pipework systems for civils, water, oil & gas, marine, plumbing and mechanical installations with a wide range of pipe materials. Gasketed mechanical pipe couplings allow pipes to be permanently joined without the need for welding, soldering or brazing, eliminating the need for on-site hot work. No pipe threading, grooving, or alternative preparation is required. This gives the system designer and contractor access to a widely used and accepted modern construction method in today’s industry.

Health and safety benefits come from the simple tools required and the use of plain end pipe. There is no heating, welding or manipulation of material on site, so handling is easy and safe. The coupling is light in weight, has no loose parts and all materials are REACH and RoHS compliant and manufactured under an ISO 9001 quality programme. Gaskets are NSF 61 compliant.

The high-level performance of GMCs allows gravity systems to be uprated. For example, where CISPI 310 states that thrust restraint systems are required, a GMC can fulfil the regulation. Global manufacturers of hubless cast iron utilize GMCs in sensitive locations as part of their overall systems.
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>REFERENCED 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.”
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).
Proposals

Item #: 179
UPC 2024  Section: 705.10.3

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Revise text

705.10.3 Plastic Pipe to Other Materials. Where connecting plastic pipe to other types of plastic or other types of piping material; approved listed adapter or transition fittings and listed for the specific transition intended shall be used. 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. While there is a code change to place this change in Chapter 3 as a prohibited practice it is also important that this be in this section as a prohibited practice to aid the end user and AHJ.
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.
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.
Proposals

Item #: 182

UPC 2024 Section: 707.4

SUBMITTER: Mark Woodwick
Woodwick Plumbing LLC

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 flood rim, serving each urinal or battery of toilets, regardless of the location of the urinal or battery of toilets 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, 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:
Imagine if you will, a battery of 6 toilets in a public restroom that are nearly overflowing due to a down stream blockage. Per the current code, the clean out by which to run the line with a drain machine is located only above the finished floor yet it is below the flood rim of all these toilets. The ensuing mess is and has been horrible.

Whereas, if the clean out is required by code to be above the flood rim of these fixtures, the sewage is not spilt all over the floor, but is contained and the blockage can be cleared more readily.

Please amend the clean out location requirement to be above the flood rim of any fixture served.
Proposals

Item #: 183
UPC 2024  Section: 707.4.1

SUBMITTER: David Mann
CA State Pipe Trades Council

RECOMMENDATION:
Add new 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, 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.

707.4.1 Load Rated Cover. Cleanout floor Covers and top rims meant to take loads shall be rated for the loading in accordance with ASME A112.36.2M.

Note: ASME A112.36.2M 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 code book is currently silent on load bearing covers for floor cleanouts. This is a safety feature that should be included to guide the end users to make sound judgments on appropriate loading applications for these cleanout covers.
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 Building drain piping shall be run in practical alignment and a uniform slope of not less than \( \frac{1}{4} \) 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 \( \frac{1}{4} \) 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 \( \frac{1}{8} \) 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.
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 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 piping 4-5 inches (100-127 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.

TABLE 703.2

<table>
<thead>
<tr>
<th>SIZE OF PIPE (inches)</th>
<th>1¼</th>
<th>1½</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>8</th>
<th>10</th>
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<tbody>
<tr>
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<tr>
<td>Drainage Piping¹</td>
<td>1</td>
<td>12</td>
<td>16³</td>
<td>48⁴</td>
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<td>600</td>
<td>1380</td>
<td>3600</td>
<td>5600</td>
<td>8400</td>
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<tr>
<td>Vertical</td>
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<td>1</td>
<td>17</td>
<td>8³</td>
<td>35⁴</td>
<td>216⁵</td>
<td>720⁵</td>
<td>2640⁵</td>
<td>4680⁵</td>
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<td>Drainage Piping</td>
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<td>750</td>
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<td>Vertical, (feet)</td>
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<td></td>
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<td>390</td>
<td>510</td>
<td>750</td>
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<td><strong>Vent Piping</strong></td>
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<td>Horizontal and Vertical⁶</td>
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<td>Maximum Units</td>
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<td>Maximum Lengths, (feet)</td>
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<td>256</td>
<td>300</td>
<td>600</td>
<td>1380</td>
<td>3600</td>
</tr>
</tbody>
</table>

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm

Notes:
¹ Excluding trap arm.
² Except for sinks, urinals, and dishwashers – exceeding 1 fixture unit.
³ Except for six-unit traps or water closets.
⁴ Not to exceed five six water closets or five six-unit traps.
⁵ Based on ¼ inch per foot (20.8 mm/m) slope. For 1/8 of an inch per foot (10.4 mm/m) slope, multiply horizontal fixture units by a factor of 0.8.
⁶ The diameter of an individual vent shall be not less than 1¼ inches (32 mm) nor less than one-half the diameter of the drain to which it is connected. Fixture unit load values for drainage and vent piping shall be computed from Table 702.1 and Table 702.2. Not to exceed one-third of the total permitted length of a vent shall be permitted to be installed in a horizontal position. Where vents are increased one pipe size for their
entire length, the maximum length limitations specified in this table do not apply. This table is in accordance with the requirements of Section 901.3.

7 Up to 8 public lavatories are permitted to be installed on a 1½ inch (40 mm) vertical branch or horizontal sanitary branch sloped at ¼ inch per foot (20.8 mm/m).

**SUBSTANTIATION:**
The 1/8 slope with the 0.8 factor of Note (5) in Table 703.2, should not be permitted for 4 inch pipe due to requirements of low flow water closets and other water conserving fixtures. The lack of volume of the low flow fixtures have less scouring and carrying rate. The two-percent slope verses a one-percent slope helps alleviate these issues.
Proposals

Item #: 186

UPC 2024 Section: 710.3

SUBMITTER: Karan Kapila
   Self

RECOMMENDATION:
   Revise text

710.0 Drainage of Fixtures Located Below the Next Upstream Manhole or Below the Main Sewer Level.

710.31101.7 Building Subdrains. Building subdrains located below the public sewer level shall discharge into a
   sump or receiving tank, the contents of which shall be automatically lifted and discharged into the drainage system
   as required for building sumps.

(renumber remaining sections)

(Section 710.2 is shown for information purposes only)

710.2 Sewage Discharge. Drainage piping serving fixtures that are located below the crown level of the main
   sewer shall discharge into an approved watertight sump or receiving tank, so located as to receive the sewage or
   wastes by gravity. From such sump or receiving tank, the sewage or other liquid wastes shall be lifted and
   discharged into the building drain or building sewer by approved ejectors, pumps, or other equally efficient approved
   mechanical devices.

SUBSTANTIATION:
   Chapter 11 contains provisions on storm drainage. Section 1101.7 is not intended for storm drainage and should be
   moved to Chapter 7 as building Subdrains are addressed there. The above recommendation would relocate the
   section “building subdrains” to Chapter 7 where it will be in context with language addressing sewer piping below
   main sewer level.
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.
Proposals

Item #: 188

UPC 2024 Section: 710.6, Table 1701.1

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.

710.6 Backwater Valves. Backwater valves, gate valves, fullway ball valves, unions, motors, compressors, air tanks, and other mechanical devices required by this section shall be located where they will be accessible for inspection and repair and, unless continuously exposed, shall be enclosed in a masonry pit fitted with an adequately sized removable cover.

Backwater valves shall comply with ASME A112.14.1 or IAPMO IGC 305, and have bodies of cast-iron, plastic, copper alloy, or other approved materials; shall have noncorrosive bearings, seats, and self-aligning discs; and shall be constructed to ensure a positive mechanical seal. Such backwater valves shall remain open during periods of low flows to avoid screening of solids and shall not restrict capacities or cause excessive turbulence during peak loads. Unless otherwise listed, valve access covers shall be bolted type with gasket, and each valve shall bear the manufacturer’s name cast into the body and the cover.

<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 305-2019</td>
<td>ABS and PVC Horizontal Backwater Valves with Lifting Devices</td>
<td>Valves</td>
<td>710.6</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO IGC 305 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 IAPMO IGC 305 standard covers backwater valves intended for wastewater/sewage systems. Backwater valves can be buried at depths which are difficult to service without having to dig them out. The valves covered under IAPMO IGC 305 contain an access port to a lifting device that allows removal of the backwater valve mechanism for cleaning and maintenance.
Proposals

Item #: 189
UPC 2024  Section: 710.9

SUBMITTER: David Mann
CA State Pipe Trades Council

RECOMMENDATION:
Revise text

710.0 Drainage of Fixtures Located Below the Next Upstream Manhole or Below the Main Sewer Level.

710.9 Alarm. Such sumps and receiving tanks shall be automatically discharged and, wherein a “public use” occupancy, shall be provided with dual pumps or ejectors arranged to function alternately in normal use and independently. Such pumps shall be capable of running continuously in case of overload or mechanical failure of one of the pumps or ejectors. The pumps shall have an audio and visual alarm, readily accessible, that signals pump failure or an overload condition. The lowest inlet shall have a clearance of not less than 2 inches (51 mm) from the highwater or “starting” level of the sump.

SUBSTANTIATION:
The modification clarifies that for public use occupancy, a dual pump system is required to run alternatively, one at a time. Each pump should be capable or running on its own in case one of the pumps fails.
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 piping 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.
Proposals

Item #: 191

UPC 2024  Section: 713.2

SUBMITTER: Bob Adler
Self

RECOMMENDATION:
Revise text

713.0 Sewer Required.

713.2 Private Sewage Disposal System. Where no public sewer intended to serve a lot or premises is available in a thoroughfare or right of way abutting such lot or premises, drainage piping from a building or works shall be connected to an approved private sewage disposal system in accordance with Appendix H or as approved by the Authority Having Jurisdiction.

SUBSTANTIATION:
Provisions for Private Sewage Disposal Systems is located in Appendix H. The proposed change directs the end user to the appropriate UPC provisions of Appendix H for private disposal systems.
Proposals

Item #: 192

UPC 2024  Section: 713.2

SUBMITTER: Shane Peters  
City of Santa Monica

RECOMMENDATION:  
Revise text

713.0 Sewer Required.

713.2 Private Sewage Disposal System. Where no public sewer intended to serve a lot or premises is available in a thoroughfare or right of way abutting such lot or premises, drainage piping from a building or works shall be connected to an approved private sewage disposal system. *(See Appendix H)*

SUBSTANTIATION:  
Further information about Private Sewage Disposal Systems is located in Appendix H. Seems a reference to Appendix H would assist many users.
Proposals

Item #: 193
UPC 2024  Section: 715.3, Table 1701.1, Table 1701.2

SUBMITTER: Grant Whittle
Nu Flow Technologies

RECOMMENDATION:
Revise text

715.0 Building Sewer Materials.
715.3 Existing Sewers. Replacement of existing building sewer and building storm sewers using trenchless methodology and materials shall be installed in accordance with ASTM F1216, ASTM F1743, ASTM F2561, ASTM F2599, or ASTM F3240.

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>REFERENCED STANDARDS</td>
</tr>
<tr>
<td>STANDARD NUMBER</td>
</tr>
<tr>
<td>ASTM F1743-2017</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: ASTM F1743 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>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES</td>
</tr>
<tr>
<td>DOCUMENT NUMBER</td>
</tr>
<tr>
<td>ASTM F1743-2017</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
ASTM F1743 is currently included in Table 1701.2 as a non-mandatory reference. ASTM F1743 has comparable performance property requirements as the alternatively mandated installation practices. Furthermore, Pull-in-Place installation is one of, if not the most, widely practiced installation methods in the plumbing and mechanical pipe sector.
Proposals

Item #: 194
UPC 2024  Section: 715.3.1, 715.3.2

SUBMITTER: Joanne Carroll
Subtegic Group Inc.

RECOMMENDATION:
Add new text

715.0 Building Sewer Materials.

715.3 Existing Sewers. Replacement of existing building sewer and building storm sewers using trenchless methodology and materials shall be installed in accordance with ASTM F1216, ASTM F2561, ASTM F2599, or ASTM F3240.

715.3.1 Cured-In-Place Pipe Material. Cured-in-place pipe materials shall be comprised of a specific textile tube combined with a specific resin system at a specific wall thickness that shall be listed (third-party certified) by a listing agency (accredited conformity assessment body) as complying with this code and the approved applicable recognized standards referenced in this code.

715.3.2 Post-Installation Inspection. The installed replacement 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 and this code.

SUBSTANTIATION:
This addition provides improved efficiencies for code enforcement by including third-party certification for cured-in-place pipe materials. With this addition code officials can easily determine if materials compliant with the code are being used. Because trenchless methodology does not uncover the existing pipe, the addition of post-installation inspection is key to enforcement of the code and verification of compliance of the installed replacement pipe with the code. Although this requirement is included in all of the referenced standards, the addition of this subsection in the code makes the code more user friendly and can improve efficiencies during enforcement. In summary, acceptance of this change will remove confusion in the industry surrounding the use of trenchless methodology and will provide clarity and improve efficiencies for enforcement of the code as it pertains to the use of trenchless methodology and cured-in-place pipe materials to replace or repair buried piping.
**Proposals**

Item #: 195

UPC 2024  Section: 715.3 – 715.3.2, Table 1701.1

**SUBMITTER:** Bruce A Pfeiffer  
Retired - City of Topeka

**RECOMMENDATION:**
Revise text

715.0 Building Sewer Materials.

715.3 *Trenchless Lining or Replacement of Existing Sewers.* Replacement of existing building sewer and building storm sewers using trenchless methodology and materials. Trenchless or replacement of existing sewers shall be in accordance with the Section 715.3.1 or Section 715.3.2.

715.3.1 *Sewer Pipe Lining.* The trenchless installation of resin-impregnated flexible tubing to line existing building sewers and building storm sewers shall be installed in accordance with ASTM F1216, ASTM F2561, ASTM F2599, or ASTM F3240.

715.3.2 *Sewer Pipe Replacement.* The trenchless installation of polyethylene (PE) pipe using the pipe bursting method to replace existing building sewers and building storm sewers shall comply with ASTM F714, ASTM F894 and installed in accordance with IAPMO IS 26.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO IS 26-2019</td>
<td>Trenchless Insertion of Polyethylene (PE) Pipe for Sewer Laterals</td>
<td>Piping</td>
<td>715.3.2</td>
</tr>
</tbody>
</table>

(portion of table not shown remain unchanged)

**Note:** ASTM F714, ASTM F894, and IAPMO IS 26 meet the requirements for mandatory reference standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

**SUBSTANTIATION:**
The replacement of existing sewer pipe with Polyethylene (PE) pipe as part of a trenchless pipe bursting methodology is addressed in the standards found in Table 701.2 (ASTM F714-13) and in the Installation Standards, IS 26-2019, but is not mentioned in the body of the Code. Many jurisdictions believe that pipe lining is the only trenchless method of sewer repair/replacement allowed by Code. This new section explains the difference between the two types of products and the standards by which they need to be installed.
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 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 F1216-2016</td>
<td>Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube</td>
<td>Piping</td>
<td>715.3</td>
</tr>
<tr>
<td>ASTM F2561-2017</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>
<td>715.3</td>
</tr>
<tr>
<td>ASTM F2599-2016</td>
<td>The Sectional Repair of Damaged Pipe by Means of an Inverted Cured-In-Place Liner</td>
<td>Piping</td>
<td>715.3</td>
</tr>
<tr>
<td>ASTM F3240-2017</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>
<td>715.3</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**TABLE 1701.2 STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
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<tbody>
<tr>
<td>ASTM F1216-2016</td>
<td>Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube</td>
<td>Piping</td>
</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)
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."
Proposals

Item #: 197

UPC 2024  Section: 718.1

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Revise text

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 ¼ 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 ¼ 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:
While there is a reference to Table 717.1 in the previous section and the table is located between the 2 sections, adding a ‘reminder’ here for users is prudent.
803.0 Indirect Waste Piping.

803.3 Pipe Size and Length. Except as hereinafter provided, the size of indirect waste piping shall be in accordance with other sections of this code applicable to drainage and vent piping. No vent from indirect waste piping shall combine with a sewer-connected vent, but Vents from indirect waste piping shall extend separately to the outside air. Indirect waste pipes exceeding 5 feet (1524 mm), but less than 15 feet (4572 mm) in length shall be directly trapped, but such traps need not be vented.

Indirect waste pipes less than 15 feet (4572 mm) in length shall be not less than the diameter of the drain outlet or tailpiece of the fixture, appliance, or equipment served, and in no case less than 1/2 of an inch (15 mm). Angles and changes of direction in such indirect waste pipes shall be provided with cleanouts to permit flushing and cleaning.

SUBSTANTIATION:
As written, the text on vents gives the provision followed by an exception. Placing a period and stating exactly what is needed will remove any confusion. This change will clarify the intent of the section. Indirect waste pipes must vent separately to the outside.
Proposals

Item #: 199
UPC 2024  Section: 803.3

SUBMITTER: Samantha Liu  
Self

RECOMMENDATION:  
Revise text

803.0 Indirect Waste Piping.

803.3 Pipe Size and Length. Except as hereinafter provided, the size of indirect waste piping shall be in accordance with other sections of this code applicable to drainage and vent piping. No vent from indirect waste piping shall combine with a sewer-connected vent, but shall extend separately to the outside air. Indirect waste pipes exceeding 5 feet (1524 mm), but less than 15 feet (4572 mm) in length shall be directly trapped, but such traps need not be vented.

Indirect waste pipes less than 15 feet (4572 mm) in length shall be not less than the diameter of the drain outlet or tailpiece of the fixture, appliance, or equipment served, and in no case less than 1/2 of an inch (15 mm). Angles and changes of direction in such indirect waste pipes shall be provided with cleanouts to permit flushing and cleaning.

Exceptions:
(1) Refrigeration coils and ice-maker machines shall not be limited in length.
(2) The trap, drain, and vent shall comply with the sizing requirements of Section 702.0, Section 703.0 and Section 904.0 if the indirect waste piping exceeds 15 feet (4572 mm) in length.

(below shown for reference only)

702.0 Fixture Unit Equivalents.

703.0 Size of Drainage Piping.

904.0 Size of Vents.

SUBSTANTIATION:  
There is great confusion regarding indirect waste pipe length limitations, when to trap, and when to vent. Section 801.3 is easily overlooked regarding the exception to the 15 foot limitation and causes confusion in Section 803.3 as refrigeration coils and ice makers do not apply. Furthermore, Section 801.3.1 limits indirect waste to 15 feet, adding to the confusion as to what to do beyond the 15 feet. The addition of the exceptions intends to clarify the intent between Sections 803.3 and Section 801.3.1.
Proposals

Item #: 200

UPC 2024  Section: 807.1

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Revise text

807.0 Appliances.

807.1 Non-Classed Apparatus. Commercial dishwashing machines, silverware washing machines, and other appliances, devices, equipment, or other apparatus not regularly classed as plumbing fixtures, which are equipped with pumps, drips, or drainage outlets, shall be permitted to be drained by indirect waste pipes discharging through an air break into an approved type of open receptor.

SUBSTANTIATION:
The change is adding an air break for clarification as it is already allowed in Section 414.3 for commercial dishwashing machines. Adding the specific indirect connection type will assist the end user to clarify what indirect method should be used without having to look back to Section 414.3. This does not preclude the use of an air gap installation which is more restrictive.
Proposals

Item #: 201
UPC 2024  Section: 807.3, 807.3.1, Table 1701.1, Table 1701.2

SUBMITTER: Mike Durfee
self

RECOMMENDATION:
Revise text

807.0 Appliances.

807.3 Domestic Dishwashing Machine. No domestic dishwashing machine shall be directly connected to a drainage system or food waste disposer without the use of an approved dishwasher air gap fitting on the discharge side of the dishwashing machine. Listed dishwasher air gaps fittings shall be installed with the flood-level (FL) marking at or above the flood level of the sink or drainboard, whichever is higher.

807.3.1 Dishwasher Airgap Fittings. Dishwasher air gap fitting shall comply with IAPMO PS 23.

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
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<tbody>
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<td>REFERENCED STANDARDS</td>
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</tbody>
</table>

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<thead>
<tr>
<th>STANDARD NUMBER</th>
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<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO PS 23-2019</td>
<td>Dishwasher Drain Airgaps</td>
<td>Backflow Protection</td>
<td>807.3.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: IAPMO PS 23 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>TABLE 1701.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES</td>
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<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO PS-23-2006a</td>
<td>Dishwasher Drain Airgaps</td>
<td>Backflow Protection</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
The proposed change clarifies that air gap fittings are specific to dishwashing machines, covered in Section 807.3. Additionally, the proposed new section calls out the appropriate standard to establish a generally acceptable quality standard for dishwasher airgap fittings. The standards will assist inspectors and users to ensure minimum design requirements are met for the health and safety of public.
Proposals

Item #: 202

UPC 2024  Section: 414.3, 807.3

SUBMITTER: Cathy Tran
MN DEPT OF LABOR & INDUSTRY

RECOMMENDATION:
Revise text

807.0 Appliances.

807.3 Domestic Dishwashing Machine. No domestic dishwashing machine shall be directly connected to a drainage system or food waste disposer without the use of an approved dishwasher air gap fitting on the discharge side of the dishwashing machine, or run as the discharge line as high as possible under the countertop, securely fastened. Listed air gap fittings shall be installed with the flood-level (FL) marking at or above the flood level of the sink or drainboard, whichever is higher.

414.0 Dishwashing Machines.

414.3 Drainage Connection. Domestic dishwashing machines shall discharge indirectly through an air gap fitting in accordance with Section 807.3 into a waste receptor, a wye branch fitting on the tailpiece of a kitchen sink, or dishwasher connection of a food waste disposer. Commercial dishwashing machines shall discharge indirectly through an air break or direct connection. The indirect discharge for commercial dishwashing machines shall be in accordance with Section 807.1, and the direct discharge shall be in accordance with Section 704.3.

SUBSTANTIATION:
The proposed change seeks modifications to Sections 807.3 and Section 414.3 by adding another installation method for a domestic dishwasher machine that does not require an installation of a listed air gap fitting on the discharge side of the dishwasher. The additional installation method allows the domestic dishwasher machine discharge pipe to be secured and routed as high as possible under the countertop and connected to a tailpiece of a kitchen sink or food waste grinder. This proposed additional installation option is consistent with other national model codes. The change is reasonable because it allows for another installation option that has historically been proven protective with lower installation costs, adds installation flexibility for homes, and yet prevents unsanitary conditions from waste water backups from the kitchen sink or sewage backups.

Section 807.3 change also includes adding the word “fittings” in the last sentence for correct and consistent use of the “listed air gap fittings” rather than “listed air gaps” and not a substantive change.
809.0 **Drinking Fountains.**

809.1 **General.** Drinking fountains shall be permitted to be installed with indirect wastes through an air break.

415.3 **Drainage Connection.** Drinking fountains shall be permitted to discharge directly into the drainage system or indirectly through an air break in accordance with Section 809.1.

SUBSTANTIATION: Section 415.3 refers to Section 809.1 for indirect waste of drinking fountains. However, Section 809.1 does not give any guidance. The additional language to Section 809.1 is needed to specify the intent of the section.
Proposals

Item #: 204
UPC 2024 Section: 814.1

SUBMITTER: Karan Kapila
Self

RECOMMENDATION:
Revise text

814.0 Condensate Waste and Control.
814.1 Condensate Disposal. Condensate from air washers, air-cooling coils, condensing appliances, and the overflow from evaporative coolers and similar water-supplied equipment or similar air-conditioning equipment shall be collected and discharged to an approved plumbing fixture or disposal area. Where discharged into the drainage system, equipment shall drain using an indirect waste pipe. The waste pipe shall have a slope of not less than 1/8 inch per foot (10.4 mm/m) or 1 percent slope and shall be of an approved corrosion-resistant material not smaller than the outlet size in accordance with Section 814.3 or Section 814.4 for air-cooling coils or condensing appliances, respectively. Condensate or wastewater shall not drain over a public way, a street, alley way, or location that will cause a nuisance.

SUBSTANTIATION:
The change adds examples that may not necessarily be considered a public way. Additionally, such locations mentioned may not cover an area that will cause a nuisance.
Proposals

Item #: 205
UPC 2024  Section: 814.2

SUBMITTER: Karan Kapila  
Self

RECOMMENDATION:
Revise text

814.0 Condensate Waste and Control.

814.2 Condensate Control. Where any equipment or appliance is installed in a space where damage is capable of resulting from condensate overflow, a drain line shall be provided and shall be drained in accordance with Section 814.1. An additional protection method for condensate overflow shall be provided in accordance with one of the following:

(1) A water level detecting device that will shut off the equipment or appliance in the event the primary drain is blocked.
(2) An additional watertight pan of corrosion-resistant material, with a separate drain line, installed beneath the cooling coil, unit, or the appliance to catch the overflow condensate due to a clogged primary condensate drain.
(3) An additional drain line at a level that is higher than the primary drain line connection of the drain pan.
(4) An additional watertight pan of corrosion-resistant material with a water level detection device installed beneath the cooling coil, unit, or the appliance to catch the overflow condensate due to a clogged primary condensate drain and to shut off the equipment.

The additional pan or the additional drain line connection shall be provided with a drain pipe of not less than 3/4 of an inch (20 mm) nominal pipe size, discharging at a point that is readily observed. The terminating ends of condensate drain lines shall be marked to identify whether such condensate drain line is from a primary or secondary drain.

SUBSTANTIATION:
It is important to determine where the condensate is coming from. If you see two condensate lines near each other it is impossible to determine whether it is a primary of the secondary drain. An inspector or owner will not be able to identify an emergency that needs attention until the inspector or owner physically looks inside the drain pans to see where it was coming from. Identifying the condensate lines will allow the appropriate action to be taken quickly and prevent unnecessary damage.
Proposals

Item #: 206

UPC 2024  Section: 814.2

SUBMITTER: Karan Kapila
Self

RECOMMENDATION:
Revise text

814.0 Condensate Waste and Control.

814.2 Condensate Control. Where any equipment or appliance is installed in a space where damage is capable of resulting from condensate overflow, a drain line shall be provided and shall be drained in accordance with Section 814.1. An additional protection method for condensate overflow shall be provided in accordance with one of the following:

(1) A water level detecting device that will shut off the equipment or appliance in the event the primary drain is blocked. Such detecting devise shall be installed inside the primary pan above the primary drain and below the flood level rim of the pan.

(2) An additional watertight pan of corrosion-resistant material, with a separate drain line, installed beneath the cooling coil, unit, or the appliance to catch the overflow condensate due to a clogged primary condensate drain.

(3) An additional drain line at a level that is higher than the primary drain line connection of the drain pan.

(4) An additional watertight pan of corrosion-resistant material with a water level detection device installed beneath the cooling coil, unit, or the appliance to catch the overflow condensate due to a clogged primary condensate drain and to shut off the equipment.

The additional pan or the additional drain line connection shall be provided with a drain pipe of not less than 3/4 of an inch (20 mm) nominal pipe size, discharging at a point that is readily observed.

SUBSTANTIATION:
As written, option (1) is not clear where a water detecting device shall be installed. The language gives clear direction to the location and will prevent installers from placing such devices in the drain line.
Proposals

Item #: 207
UPC 2024  Section: 814.2

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION: Revise text

814.0 Condensate Waste and Control.

814.2 Condensate Control. Where any equipment or appliance is installed in a space where damage is capable of resulting from condensate overflow, a drain line shall be provided and shall be drained in accordance with Section 814.1. An additional protection method for condensate overflow shall be provided in accordance with one of the following:

(1) A water level detecting device that will shut off the equipment or appliance in the event the primary drain is blocked.

(2) An additional watertight pan of corrosion-resistant material, with a separate drain line, installed beneath the cooling coil, unit, or the appliance to catch the overflow condensate due to a clogged primary condensate drain.

(3) An additional separate drain line at a level that is higher than the primary drain line connection of the drain pan.

(4) An additional watertight pan of corrosion-resistant material with a water level detection device installed beneath the cooling coil, unit, or the appliance to catch the overflow condensate due to a clogged primary condensate drain and to shut off the equipment.

The additional pan or the additional drain line connection shall be provided with a drain pipe of not less than 3/4 of an inch (20 mm) nominal pipe size, discharging at a point that is readily observed.

SUBSTANTIATION:
The addition of "separate" ensures that the primary and secondary condensate drains are not tied together. They must be run separate in case the primary is clogged.
Proposals

Item #: 208
UPC 2024 Section: 814.2, Table 1701.1

SUBMITTER: John Taecker
UL LLC

RECOMMENDATION: Revise text

814.0 Condensate Waste and Control.

814.2 Condensate Control. Where any equipment or appliance is installed in a space where damage is capable of resulting from condensate overflow, a drain line shall be provided and shall be drained in accordance with Section 814. An additional protection method for condensate overflow shall be provided in accordance with one of the following:

1. A water level detecting device listed and labeled to UL 508 that will shut off the equipment or appliance in the event the primary drain is blocked.
2. An additional watertight pan of corrosion-resistant material, with a separate drain line, installed beneath the cooling coil, unit, or the appliance to catch the overflow condensate due to a clogged primary condensate drain.
3. An additional drain line at a level that is higher than the primary drain line connection of the drain pan.
4. An additional watertight pan of corrosion-resistant material with a water level detection device listed and labeled to UL 508 installed beneath the cooling coil, unit, or the appliance to catch the overflow condensate due to a clogged primary condensate drain and to shut off the equipment.

The additional pan or the additional drain line connection shall be provided with a drain pipe of not less than 3/4 of an inch (20 mm) nominal pipe size, discharging at a point that is readily observed.

<table>
<thead>
<tr>
<th>TABLE 1701.1 REFERENCED STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARD NUMBER</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>UL 508-2018</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: UL 508 meets the requirements for mandatory reference standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
Water level detecting devices need to properly function where used as part of the protection method for condensate overflow. UL 508 is the standard used for listing and labeling of these types of devices.
Proposals

Item #: 209
UPC 2024 Section: 814.3

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

814.0 Condensate Waste and Control.

814.3 Condensate Waste Pipe Material and Sizing. Condensate waste pipes from air-cooling coils shall be sized in accordance with the equipment capacity as specified in Table 814.3. The material of the piping shall comply with the pressure and temperature rating of the appliance or equipment and shall be approved for use with the liquid being discharged.

<table>
<thead>
<tr>
<th>EQUIPMENT CAPACITY IN TONS OF REFRIGERATION</th>
<th>MINIMUM CONDENSATE PIPE DIAMETER (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 20</td>
<td>3/4</td>
</tr>
<tr>
<td>21 – 40</td>
<td>1</td>
</tr>
<tr>
<td>41 – 90</td>
<td>1 1/4</td>
</tr>
<tr>
<td>91 – 125</td>
<td>1 1/2</td>
</tr>
<tr>
<td>126 – 250</td>
<td>2</td>
</tr>
</tbody>
</table>

For SI units: 1 ton of refrigerant = 3.52 kW, 1 inch = 25 mm

The size of condensate waste pipes is for one unit or a combination of units, or as recommended by the manufacturer. The capacity of waste pipes assumes a 1/8 inch per foot (10.4 mm/m) or 1 percent slope, with the pipe running threequarters full at the following pipe conditions:

<table>
<thead>
<tr>
<th>Outside Air – 20%</th>
<th>Room Air – 80%</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB</td>
<td>WB</td>
</tr>
<tr>
<td>90°F</td>
<td>73°F</td>
</tr>
<tr>
<td>75°F</td>
<td>62.5°F</td>
</tr>
</tbody>
</table>

For SI units: °C = (°F-32)/1.8

Condensate drain sizing for other slopes or other conditions shall be approved by the Authority Having Jurisdiction.

Air-conditioning waste pipes, 1 ¼ of an inch (32 mm) and larger in size, shall be constructed of materials specified in Chapter 7. Condensate waste piping less than 1 ¼ of an inch (32 mm) in size shall be permitted to be PVC, CPVC, PE, PP, copper, or other rigid materials approved by the Authority Having Jurisdiction.

SUBSTANTIATION:
Section 814.3 addresses condensate piping for air-conditioning equipment by stating that the material must meet the requirements found in Chapter 7. If the materials found in Table 701.2 are required to be used, the minimum size of piping, per Table 703.2, would be 1-1/4". Many air-conditioning condensate lines are 3/4" and 1" There is no drainage pipe or fittings available in those sizes. Listing acceptable materials for smaller sizes of condensate waste lines in the Code, will eliminate interpretation issues between installers and the AHJ.
Proposals

Item #: 210

UPC 2024  Section: 814.3, 814.3.2

SUBMITTER: Arnie Rodio
Self

RECOMMENDATION:
Revise text

814.0 Condensate Waste and Control.

814.3 Condensate Waste Pipe Material and Sizing. Condensate waste pipes from air-cooling coils shall be sized in accordance with the equipment capacity as specified in Table 814.3. The material of the piping shall comply with the pressure and temperature rating of the appliance or equipment and shall be approved for use with the liquid being discharged.

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For SI units: 1 ton of refrigerant = 3.52 kW, 1 inch = 25 mm

The size of condensate waste pipes is for one unit or a combination of units, or as recommended by the manufacturer. The capacity of waste pipes assumes a 1/8 inch per foot (10.4 mm/m) or 1 percent slope, with the pipe running three-quarters full at the following pipe conditions:

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</tr>
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</table>

For SI units: °C = (°F-32)/1.8

Condensate drain sizing for other slopes or other conditions shall be approved by the Authority Having Jurisdiction.

Air conditioning waste pipes shall be constructed of materials specified in Chapter 7.

814.3.2 Material. Condensate waste pipes shall be constructed of materials specified in Table 701.2.

(below shown for reference only)

<table>
<thead>
<tr>
<th>TABLE 701.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATERIALS FOR DRAIN, WASTE, VENT PIPE AND FITTINGS</td>
</tr>
<tr>
<td>(portions of table not shown remain unchanged)</td>
</tr>
</tbody>
</table>
SUBSTANTIATION:
The last sentence is being relocated as its own section (814.3.2 Material) to make it visible and clear as to what materials are permitted for condensate waste. Currently the section indicates that “air conditioning” waste pipes shall be in accordance with Chapter 7. The term “Chapter 7” is being replaced with “Table 701.2” which lists the acceptable materials for condensate lines. Additionally, “air-conditioning” is being replaced with “condensate waste” as condensate is generated by other means than air-conditioning.
Proposals

Item #: 211
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, 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.

SUBSTANTIATION:
The change 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.
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.
Proposals

Item #: 213
UPC 2024  Section: 814.5

SUBMITTER: Bruce A Pfeiffer  
Retired - City of Topeka

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, leach pits, or the tailpiece of plumbing fixtures. Condensate from roof top air conditioning units may drain indirectly into a roof drain. A condensate drain shall be trapped in accordance with the appliance manufacturer’s instructions or as approved.

SUBSTANTIATION:
Condensate is essentially distilled water, low in mineral content and when pure is neutral (pH 7). Condensate in contact with air is slightly acidic (approximately pH 5.6) due to dissolved carbon dioxide (CO2)(COX2). The same applies to rainwater.
Proposals

Item #: 214
UPC 2024  Section: 905.5

SUBMITTER: David Mann
CA State Pipe Trades Council

RECOMMENDATION:
Revise text

905.0 Vent Pipe Grades and Connections.

905.5 Location of Opening. The vent pipe opening from soil or waste pipe, except for water closets and similar fixtures, shall not be below the weir of the trap.

Exception: Water closets and similar fixtures.

SUBSTANTIATION:
The above recommendation is to relocate the stricken language as an exception. Currently the language is mixed as one sentence with what is allowed and what is not. The change will make the intent clear.
Proposals

Item #: 215

UPC 2024  Section: 906.7

SUBMITTER:  David Mann
CA State Pipe Trades Council

RECOMMENDATION:
Revise text

906.0 Vent Termination.

906.7 Frost or Snow Closure. Where frost or snow closure is likely to occur in locations having minimum design temperature below 0°F (-17.8°C), vent terminals shall be not less than 23 inches (688 mm) in diameter, but in no event smaller than the required vent pipe. The change in diameter shall be made inside the building not less than 1 foot (305 mm) below the roof in an insulated space and terminate not less than 10 inches (254 mm) above the roof, or in accordance with the Authority Having Jurisdiction.

SUBSTANTIATION:
The proposed change will increase terminating end of vent pipe in to prevent frost closure in freezing temperatures from 2 inches to 3 inches. Other jurisdictions use the three inch requirement to prevent frost closure. Additionally, this will be consistent with the National Standard Plumbing Code (NSPC).
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.
Proposals

Item #: 217
UPC 2024  Section: 910.4

SUBMITTER: Shane Peters  
City of Santa Monica

RECOMMENDATION:  
Revise text

910.0 Combination Waste and Vent Systems.

910.4 Connections and Size. Branches serving traps shall connect to the main line at an angle not exceeding 2 percent. Each waste pipe and each trap in such a system shall be not less than two pipe sizes exceeding the sizes required by Chapter 7 of this code, and not less than two pipe sizes exceeding a fixture tailpiece or connection.

SUBSTANTIATION:  
The belief that branches line of a CWV system serving traps can discharge into the main at a 45° angle. See images.
Proposals

Item #: 218

UPC 2024  Section: 911.1

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

911.0 Circuit Venting.
911.1 Circuit Vent Permitted. A maximum of eight floor outlet water closets, showers, bathtubs, or floor drains connected to a horizontal branch shall be permitted to be circuit vented. Each trap arm shall connect horizontally to the horizontal branch being circuit vented in accordance with Table 1002.2. The horizontal branch shall be classified as a drain and a vent from the most downstream trap arm connection to the most upstream trap arm connection to the horizontal branch.

Exception: Back-outlet and wall-hung water closets shall be permitted to be circuit vented provided that no floor-outlet fixtures are connected to the same horizontal branch. Back-outlet and wall-hung water closets shall connect horizontally to the horizontal circuit vented drain.

SUBSTANTIATION:
Currently, the exception is not clear as to “how” the back-outlet and wall-hung water closets are to be connected to the circuit vented system. As written, it can be interpreted as allowing a vertical connection to the circuit vent drainage. However, the second sentence of Section 911.1 clearly requires a horizontal-to-horizontal connection ("Each trap arm shall connect horizontally to the horizontal branch being circuit vented..."). The additional sentence to the 911.1 exception clarifies the intent of this section.
Proposals

Item #: 219

UPC 2024  Section: 911.1

SUBMITTER: Robbie Stewart
Stewart Mechanical

RECOMMENDATION:
Revise text

911.0 Circuit Venting.
911.1 Circuit Vent Permitted. A maximum of eight floor outlet water closets, showers, bathtubs, or floor drains fixtures connected to a horizontal branch shall be permitted to be circuit vented. Each trap arm shall connect horizontally to the horizontal branch being circuit vented in accordance with Table 1002.2. The horizontal branch shall be classified as a drain and a vent from the most downstream trap arm connection to the most upstream trap arm connection to the horizontal branch.

Exception: Back-outlet and wall-hung water closets shall be permitted to be circuit vented provided that no floor-outlet fixtures are connected to the same horizontal branch.

SUBSTANTIATION:
This proposed change can be thought of in 2 parts, "911.1 Circuit Vent Permitted" and the "Exception".

"911.1 Circuit Vent Permitted": The listing of specific fixtures only excludes fixtures permitted per this section in previous Code. The noted exclusions are floor mount urinals, banks of urinals, bidets, mop sinks, floor sinks, bank of lavatories, area drains. The listed excluded fixtures produce less of a water surge into the circuit vented line than that of the allowable water closets. I would ask the question what are the prohibiting factors that would exclude the other similar fixtures compared to water closets, showers, bathtubs, or floor drains? Oregon State has been allowing a form of this piping configuration for years for floor drains AND floor sinks. See, 2017 Oregon Plumbing Specialty Code (OPSC) Section 1006.2 (Vents Not Required).

Supporting document(s) has been provided to the Technical Committee for review.

"Exception": This statement could stand but is already stated as prohibited by Section 911.4 (Slope and Size of Horizontal Branch). Any fixture connecting to the horizontal circuit vent must be connected in the horizontal with the circuit vent having a grade of no greater than 1 inch per foot. As per the proposed code change, the statement is too narrow in the stated "Exception" because this statement would now need to list all approved fixtures such as lavs, urinals, etc.
Proposals

Item #: 220
UPC 2024  Section: 911.1

SUBMITTER: Armando Barragan
Self

RECOMMENDATION:
Revise text

911.0 Circuit Venting.
911.1 Circuit Vent Permitted. A maximum of eight floor outlet fixtures water closets, showers, bathtubs, or floor drains connected to a horizontal branch shall be permitted to be circuit vented. Each trap arm shall connect horizontally to the horizontal branch being circuit vented in accordance with Table 1002.2. Back-outlet, wall-hung, carrier type water closets connecting to a horizontal circuit vent branch drainpipe within the wall shall be considered a horizontal connection. The horizontal branch shall be classified as a drain and a vent from the most downstream trap arm connection to the most upstream trap arm connection to the horizontal branch.

Exception: Back-outlet and wall-hung water closets shall be permitted to be circuit vented provided that no floor-outlet fixtures are connected to the same horizontal branch.

SUBSTANTIATION:
The change is clarifying that a horizontal carrier type water closet is permitted to be circuit vented.
Item #: 221
UPC 2024  Section: 911.2, 911.2.2

SUBMITTER: Armando Barragan
Self

RECOMMENDATION:
Revise text

911.0 Circuit Venting.

911.2 Circuit Vent Size and Connection. The circuit vent size shall be in accordance with Table 703.2 according to the number of circuit vented fixtures connected to the horizontal branch but shall be not less than 2 inches (50 mm) in diameter. The vent shall connect to the horizontal branch on the vertical between the two most upstream trap arms. The circuit vent pipe shall not receive the discharge of soil or waste.

911.2.1 Multiple Circuit Vents. When multiple circuit vents are interconnected according to Section 911.4.1, each individual circuit vent shall be sized according to Section 911.2. The vent pipe connecting each circuit vent shall be sized according to Table 703.2.

911.2.2 Circuit Vent Connection. The vent shall connect to the horizontal branch on the vertical between the two most upstream trap arms. The circuit vent pipe shall not receive the discharge of soil or waste. Exception: Where the two most upstream fixtures connect at the same point, the circuit vent shall be installed downstream of this connection and upstream of the next fixture drain connection to the circuit vented horizontal branch drain.

SUBSTANTIATION:
The change relocates the second sentence of Section 911.2 as it relates to circuit vent “connections.” The remaining language, including Section 911.2.1 are related to “sizing.”

The language on “circuit vent connections” is relocated to its own new section (911.2.2). Additionally, an exception is being added to address two fixtures connecting at the same point for a circuit vent system. This is common practice in the industry but is silent in the code. This will clarify these types of installation for circuit vents.
Two most Upstream Fixtures Located "Back to Back"

Circuit Vent Location
Proposals

Item #: 222
UPC 2024  Section: 911.2, 911.2.2

SUBMITTER: Armando Barragan
Self

RECOMMENDATION:
Revise text

911.0 Circuit Venting.

911.2 Circuit Vent Size and Connection. The circuit vent size shall be in accordance with Table 703.2 according to the number of circuit vented fixtures connected to the horizontal branch but shall be not less than 2 inches (50 mm) in diameter.

911.2.2 Circuit Vent Connection. The vent shall connect to the horizontal branch on the vertical between the two most upstream trap arms. The circuit vent pipe shall not receive the discharge of soil or waste, shall be permitted to serve as a fixture drain. Fixtures discharging into the circuit vent shall be lavatories or similar fixtures and shall not exceed a total of two fixture units.

SUBSTANTIATION:
As written, the language pertaining to the circuit vent is overly restrictive. Low DFU value fixtures will not restrict or otherwise compromise the circuit vent’s ability to protect trap seals. This will be similar to the existing language for “relief vents” which allow these types of low DFU fixtures to tie in. This practice is used in many jurisdictions and a proven industry practice.

Additionally, the phrase “on the vertical” is being stricken as this requirement is already addressed for vent connection in Section 905.2 (Horizontal Drainage Pipe).
Proposals

Item #: 223
UPC 2024  Section: 911.3.1, 911.3.2

SUBMITTER: Armando Barragan
Self

RECOMMENDATION:
Revise text

911.0 Circuit Venting.

911.3 Relief Vent. A 2 inch (50 mm) relief vent shall be provided for circuit-vented horizontal branches receiving the discharge of four or more water closets when connecting to a drainage stack that receives the discharge of soil or waste from upper horizontal branches.

911.3.1 Connection and Installation. The relief vent shall connect to the horizontal branch between the stack and the most downstream trap arm of the circuit vent. The relief vent shall be installed on the vertical to the horizontal branch.

911.3.2 Fixture Drain. The relief vent is shall be permitted to serve as a fixture drain. Fixtures discharging to a relief vent shall be one or two fixture unit fixtures but shall not exceed a total of 4 fixture units.

SUBSTANTIATION:
The sentence being stricken is not needed as it is already covered in the UPC. Section 905.2 () requires a dry vent to connect above the spring line. If the vent was wet, it could tie in as permitted by code with the appropriate fittings to the horizontal or vertical. Additionally, Section 911.3.2 is being updated to add enforceable language.
Proposals

Item #: 224

UPC 2024  Section: 911.5

SUBMITTER: Armando Barragan
Self

RECOMMENDATION:
Revise text

911.0 Circuit Venting.

911.5 Additional Fixtures. Lavatories or similar fixtures, other than the circuit-vented fixtures, are permitted to discharge to the horizontal branch drain. Such fixtures shall be located on the same floor as the circuit-vented fixtures and shall be either individually or common vented.

SUBSTANTIATION:
The proposed change clarifies that the fixtures permitted are intended to be 1-drainage fixture units (DFU) or less. Lavatories and similar fixtures are such types and will not add a tremendous load on the circuit vented system.
Proposals

Item #: 225

UPC 2024 Section: 913.0 – 913.5, Table 1701.1

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Add new text

913.0 Air Admittance Valves.
913.1 General. Vent systems utilizing air admittance valves shall comply with this section. Stack-type air admittance valves shall conform to ASSE 1050. Individual and branch-type air admittance valves shall conform to ASSE 1051.
913.2 Installation. The valves shall be installed in accordance with the requirements of this section and the manufacturer’s instructions. Air admittance valves shall be installed after the DWV testing required by Section 312.2 or Section 312.3 has been performed.
913.3 Where Permitted. Individual, branch and circuit vents shall be permitted to terminate with a connection to an individual or branch-type air admittance valve in accordance with Section 918.3.1. Stack vents and vent stacks shall be permitted to terminate to stack-type air admittance valves in accordance with Section 918.3.2.
913.4 Prohibited Installations. Air admittance valves shall not be installed in nonneutralized special waste systems as described in Chapter 8 except where such valves are in compliance with ASSE 1049, are constructed of materials approved in accordance with Section 702.5, and are tested for chemical resistance in accordance with ASTM F1412. Air admittance valves shall not be located in spaces utilized as supply or return air plenums. Air admittance valves shall not be used to vent sumps or tanks except where the vent system for the sump or tank has been designed by an engineer. Air admittance valves shall not be installed on outdoor vent terminals for the sole purpose of reducing clearances to gravity air intakes or mechanical air intakes.
913.5 Chemical Waste Vent Systems. The vent system for a chemical waste system shall be independent of the sanitary vent system and shall terminate separately through the roof to the outdoors or to an air admittance valve that complies with ASSE 1049. Air admittance valves for chemical waste systems shall be constructed of materials approved in accordance with Section 702.6 and shall be tested for chemical resistance in accordance with ASTM F1412.

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<tr>
<td>ASSE 1049-2009</td>
<td>Individual and Branch Type Air Admittance Valves for Chemical Waste Systems</td>
<td>Vents</td>
<td>913.4, 913.5</td>
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<tr>
<td>ASSE 1050-2009</td>
<td>Stack Air Admittance Valves for Sanitary Drainage Systems</td>
<td>Vents</td>
<td>913.1</td>
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<td>ASSE 1051-2009</td>
<td>Individual and Branch Type Air Admittance Valves for Sanitary Drainage Systems</td>
<td>Vents</td>
<td>913.1</td>
</tr>
</tbody>
</table>

Note: ASSE 1049, ASSE 1050, ASSE 1051, and ASTM F1412 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
ASSE 1049, 1050 and 1051 provides another way of venting a drainage systems.
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 a 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
C 601.8–913.8 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 40-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. Vents for the lowest story shall be provided in accordance with Section 913.8.1 and Section 913.8.2.

913.8.1 Conditional Vent. Ventsing 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.

C 601.9–913.9 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 C 601.2 913.2

<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>
<tbody>
<tr>
<td>3</td>
<td>24</td>
<td>NP</td>
<td>NP</td>
</tr>
<tr>
<td>4</td>
<td>225</td>
<td>24</td>
<td>NP</td>
</tr>
<tr>
<td>5</td>
<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:**
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
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.
Proposals

Item #: 227
UPC 2024  Section: Table 1002.2

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

**TABLE 1002.2**
**HORIZONTAL LENGTHS OF TRAP ARMS**
**(EXCEPT FOR WATER CLOSETS AND SIMILAR FIXTURES)**

<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 ¼ 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 face of the closet flange to the inner edge of the vent) and its vent shall not exceed 6 feet (1829 mm).

**SUBSTANTIATION:**
Flanges are installed either flush with the floor or flush with the wall. This change is a clarification which will address the intent of footnote (2) as the measurement should always be taken from the face of the flange which is not necessarily the top.
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>2 ½</td>
<td>30</td>
</tr>
<tr>
<td>1½</td>
<td>3</td>
<td>42</td>
</tr>
<tr>
<td>2</td>
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<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**

**BATH TUB FIXTURE DRAIN**
INCREASED FROM 1-1/2 INCH
TO 2 INCH TO COMPLY WITH
CURRENT REQUIREMENTS

**WET VENT FROM LAVATORY**
RUNS TOWARD THE BATH TUB
FIXTURE DRAIN TO COMPLY WITH
CURRENT REQUIREMENTS

6-story mixed-use building in Portland, OR
The permissible values of the factor proposed above lead to the simple and obvious design criterion for a wet-vented bathtub drain—that the value of $Sd_i/d_i$, where $d_i$ is the diameter of the wet vent, shall not exceed unity. Figure 15 shows permissible lengths of tub drains, measured from the trap weir to the wet vent, for various slopes of the tub drain, computed from the criterion, $Sd_i/d_i = 1$.

https://archive.org/details/wetventingofplumin119fre/page/16/mode/2up
Proposals

Item #: 229
UPC 2024  Section: 1003.1

SUBMITTER: Pennie Feehan  
Pennie L Feehan Consulting  
Rep. Copper Development Association

RECOMMENDATION:
Revise text

1003.0 Traps – Described.
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 tubs, floor drains, urinals, drinking fountains, dental units, and similar fixtures shall be of standard design, weight and shall be of ABS, cast-brass copper alloy, cast-iron, lead, PP, PVC, or other approved material. An exposed and readily accessible drawn-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. Exception: Drawn-copper alloy tubing traps shall not be used for urinals. Each trap shall have the manufacturer’s name stamped legibly in the metal of the trap, and each tubing trap shall have the gauge of the tubing in addition to the manufacturer’s name. A trap shall have a smooth and uniform interior waterway. Exception: Drawn-copper alloy tubing traps shall not be used for urinals.

SUBSTANTIATION:
This proposal removes the word brass and replaces with the correct terminology. The exception is lost in the middle of the paragraph and is for urinals only. The manufacturer's name stamped and smooth and uniform interior appears to be part of the exception.
Proposals

Item #: 230
UPC 2024  Section: 1003.1

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

1003.0 Traps – Described.
1003.1 General Requirements. Each trap, except for traps within an interceptor or similar device, shall be self-cleaning. Traps shall have a smooth and uniform interior waterway. Traps for bathtubs, showers, lavatories, sinks, laundry tubs, 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 drawn-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.

Each trap shall have the manufacturer’s name and gauge or schedule legibly stamped on the trap.

Exception: Drawn-copper alloy tubing traps shall not be used for urinals. Each trap shall have the manufacturer’s name stamped legibly in the metal of the trap, and each tubing trap shall have the gauge of the tubing in addition to the manufacturer’s name. A trap shall have a smooth and uniform interior waterway.

SUBSTANTIATION:
Only the first sentence in the “exception” is a true exception. The relocated language are current provisions that are requirements and should not be exempt. The change moves the exception provisions to the body of the section.
Proposals

Item #: 231
UPC 2024  Section: 221.0, 1004.2, Table 1701.1

SUBMITTER: Gary S. Duren
Self

RECOMMENDATION:
Revise text

1004.0 Traps.

1004.2 Movable Parts. Bladders, check valves or another type of devices with movable parts shall be prohibited to serve as a trap.
Exception: Sanitary waste valves conforming to ANSI/ASME A112.18.8.

221.0 - S - Sanitary Waste Valve. A device listed and labeled to ASME A112.18.8 used as an alternate to a water-filled tubular waste trap that provides protections of the property from foul air in the sewer.

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>ANSI/ASME A112.18.8-2020</td>
<td>Sanitary Waste Valves for Plumbing Drainage Systems</td>
<td>Valves</td>
<td>1004.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: ANSI/ASME A112.18.8 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
This change is necessary to prevent any conflict within the plumbing code with respect to the installation of sanitary waste valve companion code change proposals. Additionally, a definition for “Sanitary Waste Valve” is being added for clarity.
Proposals

Item #: 232

UPC 2024  Section: 221.0, 1006.0 – 1006.4, Table 1701.1

SUBMITTER: Gary S. Duren
Self

RECOMMENDATION:
Add new text

1006.0 Sanitary Waste Valves.
1006.1 General. Sanitary waste valve shall be permitted to be installed as an alternate to the liquid seal tubular traps required in Section 1001.2. Sanitary waste valves shall comply with ANSI/ASME A112.18.8.
1006.2 Installation. Sanitary waste valves shall be installed in accordance with the requirements of Section 1006.0 and the manufacturer’s installation instructions.
1006.3 Where Permitted. Sanitary waste valves shall be permitted to be installed as an alternate to 1 ¼ inch (32 mm) and/or 1 ½ inch (40 mm) tubular traps. When a sanitary waste valve is installed on the outlet of a food waste grinder the device shall be installed in the vertical orientation.
1006.4 Location. Sanitary waste valves shall be permitted to be installed as an alternate where tubular traps are required for sinks, lavatories, laundry trays, tubs and/or showers and similar fixtures. Sanitary waste valves shall not be used on urinals. Sanitary waste valves shall be accessible.

(renumber remaining sections)

221.0 - S -
Sanitary Waste Valve. A device listed and labeled to ANSI/ASME A112.18.8 used as an alternate to a water-filled tubular waste trap that provides protections of the property from foul air in the sewer.

(below shown for reference only)

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 tub shall be connected to a separate and independent trap, except that a trap serving a laundry tub 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 tubs 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.

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>ANSI/ASME A112.18.8-2020</td>
<td>Sanitary Waste Valves for Plumbing Drainage Systems</td>
<td>Valves</td>
<td>1006.1</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)
Note: ANSI/ASME A112.18.8 meets the requirements for a mandatory referenced standard in accordance with Section 3.7.1 of IAPMO's Regulations Governing Committee Projects.

**SUBSTANTIATION:**
**REASON/PURPOSE**

This group of code changes is being introduced to improve the efficacy of the drain waste and vent system by providing a more sanitary option to the ancient practice of requiring water reservoir p-traps as the exclusive method of preventing sewer gas from entering occupied spaces. Public health and safety is thereby improved by allowing an alternate solution which reduces the risk of foul odor and disease spreading via the DWV system. The cost of construction is not negatively impacted. A definition is being added to clarify what a "Sanitary Waste Valve" is.

**BACKGROUND**

Foul air routinely enters the occupied building space when p-traps lose their water seal. Such losses are a serious area of public health concern since in recent years important research has been published that directly links the spread of harmful pathogens via the DWV piping system. The research demonstrates that there are essentially two primary means by which harmful pathogens are spread in occupied building spaces via the conventional water-reservoir-trap-based DWV system:

1. Evaporation, lack of use or over/under-pressure conditions caused by the routine discharge of a water closet depletes the water level within the trap to a point where waste water is aerosolized and released into the air currents present in buildings.[Gormley et al]
2. Water reservoirs within traps have been shown to spread pathogens via “biological slime” creeping up the drainage pipes into the adjacent sinks.[Mathers, et al]

The age old mantra of the Plumbing Industry is: “Plumbers Protect the Health of the Nation”. If this is true, now it is time to introduce an alternative to the ancient water reservoir traps into the code. ANSI/ASME A112.18.8-2020 compliant Sanitary Waste Valves (SWV) provide an effective alternate to 1-1/4” and 1-1/2” tubular water reservoir p-traps.

Since SWV’s do not retain water or other waste they are inherently more sanitary than water filled p-traps. The ASME A112.18.8-2020 Standard has been strengthened following comments at previous code cycles and now provides a 100% higher level of protection against sewer gas intrusion than is provided by water filled tubular traps currently required.

Complete copies of the latest research referenced above and additional educational materials are available at PlumbingResearchGroup.org

Proponent respectfully requests that the Committee improve the efficacy of the UPC by permitting the use of ANSI/ASME A112.18.8-20 compliant sanitary waste valves as an alternate to accessible tubular traps and improve the plumbing code. In support of this request, please consider the following statements:

**SUPPORTING STATEMENT**

Sanitary Waste Valves Intended for Use as an Alternate to 1-1/4 and 1-1/2 Tubular P-traps.

It is clearly the intent of the plumbing code that there is a water seal at every plumbing fixture outlet. The exclusive water reservoir sealing that the code currently requires has inherent physical limitations against pressure fluctuations within the DWV system. The most significant pressure fluctuations occur within the waste system upon the discharge of one or more water closets. It is well known and documented that water traps are subject to failure (full or partial loss of the two inch water seal) due to excessive positive or negative pressure excursions and also loss of the water seal can and routinely does occur due to evaporation especially in conditions of low use or high ambient temperature.

When considering acceptance of an alternate a code official must determine that the alternate meets the intent of the current code, by demonstrating equivalency in terms of strength, effectiveness, safety, and performance:

Sanitary Waste Valves comply with the code in the following ways

1. A Sanitary Waste Valve conforming to ANSI/ASME A112.18.8 is equal in strength to conventional tubular water traps since the material requirements of ASTM F409 are part of the standard.
The strength of a trap is determined by the materials used in construction and by its resistance to pressure fluctuations in the sanitary drainage system produced by flowing water.

2. A Sanitary Waste Valve conforming to ANSI/ASME A112.18.8 is more effective than a conventional tubular trap in terms of sanitation and over/under-pressure resistance.

Water traps not only retain water, they retain waste solids and other potentially dangerous bacteriological, fungal and viral pathogens. They are in effect miniature septic systems. Depending on the frequency of use and the location of the trap these solids may decay or harmful pathogens can breed, multiply and spread to surrounding areas. In food prep sinks this may cause food contamination and/or food-borne illness to occur.

A Sanitary Waste Valve is not a trap since by definition it does not significantly retain liquid (water) or foreign particles so there is not the same scope to provide a breeding ground for potentially dangerous bacteriological and harmful viral pathogens. Since a Sanitary Waste Valve has a greater resistance against pressures excursions the effectiveness of its sealing ability is greater and thereby safer over a conventional water reservoir trap, even in the fixture it serves is infrequently or never used.

3. A Sanitary Waste Valve conforming to ANSI/ASME A112.18.8 is actually safer than a conventional tubular trap in that conventional traps are subject to loss of water seal by evaporation or siphonage and the SWV is not.

Studies by Professor JA Swaffield et al of Heriot-Watt University, Edinburgh, Scotland have shown how the SARS virus was spread in 2003 throughout Amoy Gardens, a high-rise residential structure located in Hong Kong. Part of the causal effect was the failure of water traps due to evaporation, and/or losses from pressure excursions. A Sanitary Waste Valve is not subject to evaporation. A Sanitary Waste Valve is much more effective than a water trap in resisting positive and negative pressure fluctuations.

4. A Sanitary Waste Valve that conforms to ANSI/ASME A112.18.8 performance is at a minimum equal to a tubular trap in regard to reliability, connectivity, material durability and flow capacity.

The referenced Standard contains prescriptive requirements to insure that a compliant/listed Sanitary Waste Valve meets the flow capacity and material requirements of conventional code-required 1-1/4 and 1-1/2 tubular traps. Specifically the Standard requires that the Sanitary Waste Valve must reliably and repeatedly withstand a 4” water gage back-pressure test, which is significantly beyond the capability of a fully replenished p-trap.

[Supporting document(s) has been provided to the Technical Committee for review.]
Proposals

Item #: 233
UPC 2024  Section: 1007.2, Table 1701.1, Table 1701.2, L 412.1

SUBMITTER: Mike Durfee
self

RECOMMENDATION:
Revise text

1007.0 Trap Seal Protection.

1007.2 Trap Seal Primers. Potable water supply trap seal primer valves shall comply with ASSE 1018. Drainage
and electronic design type trap seal primer devices shall comply with ASSE 1044 or IAPMO PS 76.

L 412.0 Trap Seal Protection.
L 412.1 Water Supplied Trap Primers. Water supplied trap primers shall be electronic or pressure activated and
shall use not more than 30 gallons (114 L) per year per drain. Where an alternate water source, as defined by this
code, is used for fixture flushing or other uses in the same room, the alternate water source shall be used for the
trap primer water supply.

Exception: Flushometer tailpiece trap primers in accordance with ASSE 1044 or IAPMO PS 76.

<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 76-2012a</td>
<td>Trap Primers for Fill Valves and Flushometer Valves</td>
<td>DWV Components</td>
<td>1007.2</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

Note: IAPMO PS 76 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 76-2012a</td>
<td>Trap Primers for Fill Valves and Flushometer Valves</td>
<td>DWV Components</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
ASSE 1044 and IAPMO PS 76 both cover trap primers for fill valves and flushometer valves. ASSE 1044 also
covers electronic design type trap seal primer. Additionally, IAPMO PS 76 covers trap seal primer adapters. IAPMO
PS 76 is currently referenced as an appropriate standard in Appendix L for flushometer type trap seal primers.
ASSE 1044 is also an appropriate standard for flushometer tailpiece trap seal primers. Therefore, both standards
should be referenced on both areas.
Proposals

Item #: 234

UPC 2024  Section: 1007.3

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Add new text

1007.0 Trap Seal Protection.

1007.3 Piping Material. Piping material installed from the outlet of a potable water supplied or drainage supplied trap primer to the tailpiece of a floor drain or floor sink shall be PVC, CPVC, PE, PP, copper or other rigid materials approved by the Authority Having Jurisdiction. A minimum horizontal grade of ¼ of an inch per foot (20.8 mm/m) shall be maintained to the fixture connection.

SUBSTANTIATION:
The Uniform Plumbing Code does not currently address the types of piping materials permitted downstream of a trap primer to the connecting floor drain or floor sink. This is causing interpretation issues between installers and the AHJ. A list of acceptable materials in the Code would clarify what piping materials are acceptable for this application.
Proposals

Item #: 235

UPC 2024  Section: 1007.3, Table 1701.1

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Add new text

1007.0 Trap Seal Protection.

1007.3 Barrier-Type Trap Seal Protection Device. A barrier-type trap seal protection device shall protect the floor drain trap seal from evaporation. Barrier-type floor drain trap seal protection devices shall conform to ASSE 1072. The devices shall be installed in accordance with the manufacturer’s instructions.

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSE 1072-2020</td>
<td>Barrier Type Trap Seal Protection for Floor Drains</td>
<td>Trap Seal</td>
<td>1007.3</td>
</tr>
</tbody>
</table>

Note: ASSE 1072 meets the requirements for a mandatory referenced standard in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
ASSE 1072 provides another method for trap seal protection as required by Section 1007.0.
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>TABLE 1009.1</th>
<th>APPROVED INTERCEPTORS (CLARIFIERS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPLICATION</td>
<td>STANDARD</td>
</tr>
<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>
<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>ASTM D6104-1997(R2011)</td>
<td>Determining the Performance of Oil/Water Separators Subjected to Surface Run-Off</td>
</tr>
<tr>
<td>IAPMO IGC 167-2011a(R2021)</td>
<td>Solid Waste Containment Interceptors</td>
</tr>
<tr>
<td>IAPMO IGC 183-2016</td>
<td>Oil/Water Separators and Coalescing Plate Separators</td>
</tr>
<tr>
<td>IAPMO IGC 325-2016</td>
<td>Oil/Water Separators Performance</td>
</tr>
<tr>
<td>IAPMO PS 80-2019</td>
<td>Clarifiers</td>
</tr>
</tbody>
</table>

Note: PDI-G 101 and PDI-G 102 do not meet the requirements for consensus referenced standards in accordance with Section 3-3.7.1.2 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>
<tr>
<td>IAPMO PS-80-2008</td>
<td>Clarifiers</td>
<td>DWV-Components</td>
</tr>
</tbody>
</table>

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.
1014.0 Grease Interceptors.

1014.1 General. Where it is determined by the Authority Having Jurisdiction that waste pretreatment is required, an approved type of grease interceptor(s) shall comply with ASME A112.14.3, ASME A112.14.4, CSA B481, IAPMO Z1001, PDI G-101, or PDI G-102, and sized in accordance with Section 1014.2.1 or Section 1014.3.6, shall be installed in accordance with the manufacturer’s installation instructions to receive the drainage from fixtures or equipment that produce grease-laden waste. Grease-laden waste fixtures shall include, but not be limited to, sinks and drains, such as floor drains, floor sinks, and other fixtures or equipment in serving establishments, such as restaurants, cafes, lunch counters, cafeterias, bars and clubs, hotels, hospitals, sanitariums, factory or school kitchens, or other establishments where grease is introduced into the drainage or sewage system in quantities that can effect line stoppage or hinder sewage treatment or private sewage disposal systems. A combination of hydromechanical, gravity grease interceptors and engineered systems shall be allowed to meet this code and other applicable requirements of the Authority Having Jurisdiction where space or existing physical constraints of existing buildings necessitate such installations. A grease interceptor shall not be required for individual dwelling units or private living quarters. Water closets, urinals, and other plumbing fixtures conveying human waste shall not drain into or through the grease interceptor.

SUBSTANTIATION:
This standard belongs in the general provisions as an acceptable grease interceptor standard along with the other grease interceptor standards located in Section 1014.1.
Item #: 238
UPC 2024  Section: 1014.2

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

1014.0 Grease Interceptors.

1014.2 Hydromechanical Grease Interceptors. Plumbing fixtures or equipment connected to a Type A-1 and B-2 hydromechanical grease interceptor shall discharge through an approved type of vented flow control installed in a readily accessible and visible location. Flow control devices shall be designed and installed so that the total flow through such device or devices shall at no time be greater than the rated flow of the connected grease interceptor. No flow control device having adjustable or removable parts shall be approved. The vented flow control device shall be located such that no system vent shall be between the flow control and the grease interceptor inlet. The vent or air inlet of the flow control device shall connect with the sanitary drainage vent system, as elsewhere required by this code, or shall terminate through the roof of the building, and shall not terminate to the free atmosphere inside the building.

Exception: Listed grease interceptors with integral flow controls or restricting devices shall be installed in an accessible location in accordance with the manufacturer's installation instructions.

SUBSTANTIATION:
The designations for Type A, B, C & D hydromechanical grease interceptors changed to Type 1, 2, 3 & 4 in Chapter 2 - Definitions, Section 210.0 the 2015 UPC. References to the types of hydromechanical grease interceptor in the body of the Code should use the same designations as though found in the definition.
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.
Proposals

Item #: 240
UPC 2024 Section: 1017.1 – 1017.4, Table 1701.1, Table 1701.2

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Revise text

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.

4917.21017.4 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 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 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.
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* Roof 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.
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.
Proposals

Item #: 243
UPC 2024  Section: 1103.4

SUBMITTER: Nguyen Thong Nhat
PTA Asia Consultant Co., Ltd

RECOMMENDATION:
Revise text

1103.0 Size of Leaders, Conductors, and Storm Drains.

1103.4 Side Walls Draining onto a Roof. Where vertical walls project above a roof to permit storm water to drain into the roof area below, the adjacent roof area shall be permitted to be computed from Table 1103.1 as follows:

(1) – (7) (text not shown remains unchanged)
(8) In calculation of the effective catchment area, the height of a single wall should be taken up to a maximum exposed height of 32.8 feet (10 m).

SUBSTANTIATION:
Actually, when calculating the storm water of eaves in the first floor of high-rise building, the flow rate which drain to these eaves are unrealistically large due to the height of adjacent walls, a limitation of these walls will remove the amount of rain water which was flashed out of the walls during falling procedure.

Supporting document(s) has been provided to the Technical Committee for review.
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 not be 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>
<tr>
<td>4000</td>
<td>42</td>
</tr>
<tr>
<td>4500</td>
<td>47</td>
</tr>
<tr>
<td>5000</td>
<td>52</td>
</tr>
<tr>
<td>5500</td>
<td>57</td>
</tr>
<tr>
<td>6000</td>
<td>62</td>
</tr>
<tr>
<td>6500</td>
<td>68</td>
</tr>
<tr>
<td>7000</td>
<td>73</td>
</tr>
<tr>
<td>7500</td>
<td>78</td>
</tr>
<tr>
<td>8000</td>
<td>83</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>
</tr>
<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 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>30</td>
</tr>
<tr>
<td>2¼ × 3</td>
<td>1/4</td>
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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.
Item #: 245
UPC 2024  Section: 1202.3

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

1202.0 Coverage of Piping System.

1202.3 Applications. This code chapter shall not apply to the following items:
(1) - (20) (remaining text unchanged) [NFPA 54:1.1.1.2]

SUBSTANTIATION:
This change will clarify the intent of this section. The direct extract is referencing the entire code, however, in the UPC, this section is referencing Chapter 12.
CHAPETER 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]

(renumber remaining sections)

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 54:5.3.1-5.2.1]

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 54:5.3.2.1-5.2.2.1]

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 54:5.4.1-5.3.1]

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 54:5.4.35.3.3]

1208.4.3 Allowable Pressure Drop. The design pressure loss in any a piping system under maximum probable flow conditions, from the point of delivery to the inlet connection of the appliance, all appliances served 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:

- Industrial processing or heating
- Research
- Warehousing
- 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 located inside buildings or separate areas of buildings used exclusively for one of the following:

- The piping is located in a ventilated chase or otherwise enclosed for protection against accidental gas accumulation.
- The piping joints are flanged and all pipe-to-flange connections are made by welding or brazing.

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 – 5.6.1.3]

1208.6.1 Used Materials. Pipe, fittings, valves, or other materials shall not be used again unless they are free of foreign material and have been ascertained to be adequate for the service intended. [NFPA 54:5.6.1.2 – 5.6.1.3]

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 54:5.6.3.2]

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]

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 – 5.6.2.6]

1208.6.4 Metallic Tubing. Tubing shall not be used with gases corrosive to the tubing material. [NFPA 54:5.6.3.1]

1208.6.4.1 Steel Tubing. Steel tubing shall comply with ASTM A254. [NFPA 54:5.6.3.2]

1208.6.4.2 Stainless Steel. Stainless steel tubing shall comply with one of the following:

1. ASTM A268
2. ASTM A269 [NFPA 54:5.6.3.3]

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 54:5.6.3.3]

1208.6.4.4 Aluminum Alloy Tubing. Aluminum alloy tubing shall comply with ASTM B241 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 54:5.6.5.3.5]

1208.6.4.5 Corrugated Stainless Steel Tubing. Corrugated stainless steel tubing shall be listed in accordance with CSA LC 1. [NFPA 54:5.6.3.6]

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. 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 – 5.5.4.1.3]
**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 compounding 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: 5.6.6.4-5.5.6.4.3]

**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.

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: 5.6.7.4-5.5.7.1)

**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.
(d) The fittings shall be located outdoors.
(e) The tapped fitting assembly shall be inspected and proven to be free of leaks. [NFPA 54:5.6.7.6-5.5.7.5]

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 54:5.6.10-5.5.10]

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]

327
**1208.6.13.3 Non-Metallic Flange Gaskets.** Non-metallic flange gaskets shall be in accordance with ASME B16.21. [NFPA 54:5.6.10.2-5.5.10.2]

**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]

**1208.6.13.5 Separated Flanges.** When a flanged joint is separated, the gasket shall be replaced. [NFPA 54:5.6.10.4]

**1208.7 Gas Meters.** Gas meters shall be selected for the maximum expected pressure and permissible pressure drop. [NFPA 54:5.7.1]

**1208.7.1 Location.** Gas meters shall be located in ventilated spaces readily accessible for examination, reading, replacement, or necessary maintenance. [NFPA 54:5.7.2-5.6.2.1]

**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 54:5.7.2-5.6.2.2]

**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 1208.16. [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.
   - 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 diaphragm failure.
2. 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.

**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 54:5.9.1-5.8.1]

**1208.10 Overpressure Protection Devices.** Overpressure protection devices shall be one of the following:

1. Pressure relief valve.
(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 54:5.9.8.1-5.9.8.2-5.8.1-5.8.2]

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 primary 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) Vents 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 to in accordance with GSA ANSI Z21.93/CSA 6.30 and shall be sized and installed in accordance with the manufacturers’ instructions. [NFPA 54:5.14]

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 54:7.1.1–7.1.1.2]

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 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. [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 54:7.2.1.1]

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 3¾ 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. 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 in 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. Gas valves controlling multiple systems shall be readily accessible for operation and installed so as to be protected from physical damage. They 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, 7.8.1.1—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 54:7.8.2.2—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 54:7.8.2.3—7.8.3.2]

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 shutoff valve. [NFPA 54:7.8.4.1—7.8.3.3]

1210.9.5 System Shutoff Valves. 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:

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 principles. Such rooms or below-grade installations shall have adequate positive ventilation. [NFPA 54:7.11.5.1]
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 so dictate. [NFPA 54:7.11.5.2]
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 backfire 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\(\frac{1}{2}\) inches (65 mm) NPS, or equivalent, to protect the mixing equipment in the event of an explosion passing through an automatic firecheck. The 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.

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 54:7.4.2-4.7.12.4.1]

1212.1 Connecting Appliances and Equipment. Appliances and equipment shall be connected to the building piping in accordance 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
[NFPA 54: TABLE 5.6.6.3 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>1 ¼</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>1 ½</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>2 ½</td>
<td>1 ½</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></td>
</tr>
<tr>
<td>Valve up to ½ psi</td>
<td></td>
</tr>
<tr>
<td>Valve up to 2 psi</td>
<td></td>
</tr>
<tr>
<td>Valve up to 5 psi</td>
<td></td>
</tr>
<tr>
<td>Valve up to 125 psi</td>
<td></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>GAS: UNDILUTED PROPANE</th>
</tr>
</thead>
<tbody>
<tr>
<td>INLET PRESSURE: 11.0 in. w.c.</td>
</tr>
<tr>
<td>PRESSURE DROP: 0.5 in. w.c.</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY: 1.50</td>
</tr>
</tbody>
</table>

INTENDED USE: PIPE SIZING BETWEEN SINGLE- OR SECOND-STAGE (LOW-PRESSURE) REGULATOR AND APPLIANCE

<table>
<thead>
<tr>
<th>PIPE SIZE (inch)</th>
<th>CAPACITY IN THOUSANDS OF BTU PER HOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOMINAL INSIDE:</td>
<td></td>
</tr>
<tr>
<td>½</td>
<td>0.622</td>
</tr>
<tr>
<td>¾</td>
<td>0.824</td>
</tr>
<tr>
<td>1</td>
<td>1.049</td>
</tr>
<tr>
<td>1¼</td>
<td>1.380</td>
</tr>
<tr>
<td>1½</td>
<td>1.610</td>
</tr>
<tr>
<td>2</td>
<td>2.067</td>
</tr>
<tr>
<td>2¼</td>
<td>2.469</td>
</tr>
<tr>
<td>3</td>
<td>3.068</td>
</tr>
<tr>
<td>4</td>
<td>4.026</td>
</tr>
<tr>
<td>ACTUAL:</td>
<td></td>
</tr>
<tr>
<td>LENGTH (feet)</td>
<td></td>
</tr>
<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>80-70</td>
<td>101</td>
</tr>
<tr>
<td>400-80</td>
<td>94</td>
</tr>
<tr>
<td>425-90</td>
<td>89</td>
</tr>
<tr>
<td>450-100</td>
<td>84</td>
</tr>
<tr>
<td>475-125</td>
<td>74</td>
</tr>
<tr>
<td>500-150</td>
<td>67</td>
</tr>
<tr>
<td>260-175</td>
<td>62</td>
</tr>
<tr>
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<td>61</td>
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</table>

For SI units: 1 inch = 25 mm, 1 foot = 304.8 mm
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
**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 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>
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</table>

(portions of table not shown remain 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>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 9.1.4b)</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).
1208.6 Acceptable Piping Materials and Joining Methods. Materials used for piping systems shall either comply with the requirements of *this chapter Section 1208.6.1 through Section 1208.6.7.3* or be acceptable to the Authority Having Jurisdiction. ([NFPA 54:5.6.1-15.5.1.1])

**SUBSTANTIATION:**
The phrase “this chapter” is being changed to “Section 1208.6.1 through Section 1208.6.7.3” to clarify that the piping material requirements from those subsections of Section 1208.6 shall comply to aid the code official in approving piping materials. The last part of the sentence is being removed as the AHJ is already authorized by Chapter 1 and 3 to approve/accept materials.
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 201-2018</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>

(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.
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.
Proposals

Item #: 250

UPC 2024  Section: 1210.4.1

SUBMITTER: Shane Peters
City of Santa Monica

RECOMMENDATION:
Revise text

1210.0 Gas Piping Installation.

1210.4 Concealed Piping in Buildings. (remaining text unchanged)
1210.4.1 Connections. Where gas piping is to be concealed, connections shall be of the following type:
(1) Pipe fittings such as elbows, tees, couplings, and right/left nipple/couplings.
(2) Joining tubing by brazing (see Section 1208.6.10.1).
(3) Press-connect fittings listed to CSA LC 10.
(4) CSST fittings listed to CSA LC 1.
(5) Where necessary to insert fittings into a gas pipe system that has been installed in a concealed location, the pipe shall be reconnected by welding, flanges, or the use of a right/left nipple/coupling.

SUBSTANTIATION:
This change will clarify that fittings are inserted into “systems” not into gas pipes.
Proposals

Item #: 251
UPC 2024  Section: 1215.2.1, 1215.2.2

SUBMITTER: Jonathan D Sargeant  
Omegaflex

RECOMMENDATION:
Revise text

1215.0 Required Gas Piping Size.

1215.2 Sizing of Gas Piping Systems. (remaining text unchanged)
1215.2.1 Natural Gas Piping Systems. Table 1215.2(1) through Table 1215.2(23) or sizing tables included in a listed piping system manufacturers’ installation instructions shall be used in conjunction with one of the methods described in Section 1215.1.1 through Section 1215.1.3 for piping materials other than non-corrugated stainless steel tubing. Section 1215.3 shall be used in conjunction with one of the methods described in Section 1215.1.1 through Section 1215.1.3 for non-corrugated stainless steel tubing. [{NFPA 54:6.2.1, 6.2.2}]

1215.2.2 Propane Piping Systems. Table 1215.2(24) through Table 1215.2(36) or sizing tables included in a listed piping system manufacturers’ installation instructions shall be used in conjunction with one of the methods described in Section 1215.1.1 through Section 1215.1.3 for piping materials other than non-corrugated stainless steel tubing. Section 1215.3 shall be used in conjunction with one of the methods described in Section 1215.1.1 through Section 1215.1.3 for non-corrugated stainless steel tubing. [{NFPA 54:6.3.1, 6.3.2}]

(for information only)

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. [NFPA 54:5.4.3]

SUBSTANTIATION:
To make Section 1215.2.1 and Section 1215.2.2 consistent with Section 1208.4.2. Sizing Methods Include the tables in CSST manufacturers’ design and installation guides.
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 99:3.3.159.3-3.3.162.4]

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 patient 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]

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 99:3.3.136.3-3.3.140.3]

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 99:3.3.169-3.3.163]

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 99:5.1.3.5.6.2-5.1.3.5.6.4]

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 99:5.1.3.5.11.1-5.1.3.5.11.10]

1309.2 Particulate Size. Output shall have less than or equal to 1.686 x 10^-6 pounds per cubic yard (1 mg/m^3) of permanent particulates sized 1 micron or larger at normal atmospheric pressure. [NFPA 99:5.1.3.5.11.2-5.1.3.5.11.3]

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 99:5.1.3.5.11.3-5.1.3.5.11.4]

1309.4 Compatible Materials. Materials of construction on the oxygen side of the oxygen concentrator unit shall comply with Section 1307.4. [NFPA 99:5.1.3.5.11.4-5.1.3.5.11.5]

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 99:5.1.3.5.11.5-5.1.3.5.11.6]

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 99:5.1.3.5.11.6-5.1.3.5.11.7]

1309.7 Electrical Components. The oxygen concentrator supply unit and any associated electrical equipment shall be provided with, 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 99:5.1.3.5.11.7-5.1.3.5.11.8]

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 99:5.1.3.5.11.8-5.1.3.5.11.9]

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 99:5.1.3.5.11.9-5.1.3.5.11.10]

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 99:5.1.3.5.11.10-5.1.3.5.11.11]

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 99:5.1.3.5.11.11-5.1.3.5.11.12]
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 5.1.3.9.1.13]

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 0.03 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-back pressure 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 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 will be-and are supervised such that failure of communication 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]

1323.13.4 Paint. Medical gas piping shall not be painted. [NFPA 99:5.1.11.1.5]

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 99:5.1.11.2.5-5.1.11.2.6]

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 99:5.1.11.2.6-5.1.11.2.7]

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 99:5.1.11.2.7]

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; minimal sedation; 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 be permitted to consist of the following:

- (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.

- (1) Gas cylinder or cryogenic liquid container headers in accordance with NFPA 99
- (2) Oxygen concentrator supply units in accordance with NFPA 99
- (3) Cylinder manifolds for gas cylinders in accordance with NFPA 99
- (4) Manifolds for cryogenic liquid containers in accordance with NFPA 99
- (5) Cryogenic fluid central supply systems in accordance with NFPA 99
- (6) Medical air compressor systems in accordance with NFPA 99
- (7) Proportioning air systems in accordance with NFPA 99
- (8) Medical-surgical vacuum 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

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, 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 99:5.3.7]

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 Category 2 medical gas supply is remote from a single treatment facility, the main supply line shall be provided with systems shall have 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>50–55 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</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>
</tr>
<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>160-50–185 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>
</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>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)</td>
<td>(3/8 of an inch O.D.) 5</td>
</tr>
<tr>
<td>DN10 (NPS 3/8)</td>
<td>(1/2 of an inch O.D.) 6</td>
</tr>
<tr>
<td>DN15 (NPS 1/2)</td>
<td>(5/8 of an inch O.D.) 6</td>
</tr>
<tr>
<td>DN20 (NPS 3/4)</td>
<td>(7/8 of an inch O.D.) 7</td>
</tr>
<tr>
<td>DN25 (NPS 1)</td>
<td>(11/8 of an inch O.D.) 8</td>
</tr>
<tr>
<td>DN32 (NPS 11/4)</td>
<td>(13/8 of an inch O.D.) 9</td>
</tr>
<tr>
<td>DN40 and larger (NPS 11/2)</td>
<td>(15/8 of an inch O.D.) 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>
<tr>
<td>Vertical risers, all sizes, every floor, but not to exceed:</td>
<td>15</td>
</tr>
</tbody>
</table>

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>
<tr>
<td>Vertical risers, all sizes, every floor, but not to exceed:</td>
<td>10</td>
</tr>
</tbody>
</table>

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).
Submitters: Jason M Shank
ASSE International

Recommendation: Revise text

1303.0 Health Care Facilities.

1303.9 Work Performed in Occupied Healthcare Facilities. In existing, occupied, inpatient healthcare facilities, all plumbing systems installation and remodel work shall be performed by personnel certified in accordance with ASSE/IAPMO 12010, ASSE/IAPMO 12030, and ASSE/IAPMO 12040.

Substantiation:
ASSE 12010, ASSE 12030 and ASSE 12040 have been combined into one ASSE standard 12010.
Proposals

Item #: 254

UPC 2024  Section: 1318.4 - 1318.4.2, 1319.1, 1319.1.1, 1320.2.1- 1320.2.3, 1324.4.3, 1323.10.1, Table 1701.1

SUBMITTER: Jonathan D Sargeant
Omegaflex

RECOMMENDATION:
Revise text

1318.0 Piping Materials for Field-Installed Positive Pressure Medical Gas Systems.

1318.4 Tubes for Medical Gas Systems. Tubes shall be one of the following:
(1) Hard-drawn seamless copper in accordance with ASTM B819, medical gas tube, Type L, except Type K shall be used where operating pressures are above a gauge pressure of 185 psi (1276 kPa) and the pipe sizes are larger than DN80 ([NPS 3] (31/8 inches O.D.)).
(2) Listed corrugated medical tubing (CMT) fabricated from copper alloy No. 5100 strip, meeting ASTM B103/B103M, with a design margin of 3.5, externally coated with nonmetallic sheath marked with the manufacturer's marking. The listing shall include testing to demonstrate that CMT systems can be consistently gas-purged with results equivalent to comparable medical gas copper tubing. ([NFPA 99:5.1.10.1.4])

1318.4.1 Flame Spread Index. CMT shall have a flame spread index of 25 or less and a smoke developed index of 50 or less as determined by ASTM E84. ([NFPA 99:5.1.10.1.5])

1318.4.2 CMT, Manufacturer Markings. CMT shall be identified by the manufacturer as suitable for oxygen service at a minimum of every 3 feet (914 mm). ([NFPA 99:5.1.10.1.6])

1319.0 Piping Materials for Field-Installed Medical-Surgical Vacuum Systems.

1319.1 Tubes for Medical Vacuum Systems. Piping for vacuum systems shall be constructed of any of the following:
(1) Hard-drawn seamless copper tube in accordance with the following:
(a) ASTM B88, copper tube (Type K, Type L, or Type M)
(b) ASTM B280, copper ACR tube
(c) ASTM B819, copper medical gas tubing (Type K or Type L)
(2) Stainless steel tube in accordance with the following:
(a) ASTM A269 TP304L or 316L
(b) ASTM A312 TP304L or 316L
(c) ASTM A312 TP 304L/316L, Schedule 5S pipe, and ASTM A403 WP304L/316L, Schedule 5S fittings
(3) CMT meeting the requirements of 1318.4(2). ([NFPA 99:5.1.10.2.1])

1319.1.1 Vacuum Tube Marking Where Required. If copper or CMT vacuum tubing is installed along with any medical gas tubing, the vacuum tubing shall, prior to installation, be prominently labeled or otherwise identified to preclude using materials or installation procedures in the medical gas system that are not suitable for oxygen service. ([NFPA 99:5.1.10.2.2.1])

(renumber remaining sections)

1320.0 Joints and Connections.

1320.2 Changes in Direction. (remaining text unchanged)
1320.2.1 CMT, Changes in Direction. Positive pressure patient gas systems, medical support gas systems, vacuum systems, and WAGD systems constructed of CMT shall have turns, offsets, and other changes in direction
made by bending the tubing up to the minimum bend radius or by fittings in accordance with Section 1320.2 [NFPA 99:5.1.10.3.2]

1320.2.4 Medical Vacuum Systems. (remaining text unchanged)

1320.2.3 CMT, Prohibited Connections. Branch connections made using mechanically formed, drilled, and extruded tee-branch connections shall be prohibited in CMT systems. [NFPA 99:5.1.10.3.4]

1323.0 Installation of Piping and Equipment.

1323.4 Pipe Support. (remaining text unchanged)

1323.4.3 CMT. Supports for CMT shall be in accordance with the CMT manufacturer’s installation instructions. [NFPA 99:5.1.10.11.4.4]

(renumber remaining sections)

1323.10 Qualifications of Installers. (remaining text unchanged)

1323.10.1 CMT. CMT systems shall be installed by ASSE 6010-qualified installers using the CMT manufacturer’s instructions. [NFPA 99:5.1.10.11.10.3]

(renumber remaining sections)

<table>
<thead>
<tr>
<th>TABLE 1701.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>REFERENCED STANDARDS</td>
</tr>
<tr>
<td><strong>STANDARD NUMBER</strong></td>
</tr>
<tr>
<td>ASSE 6010-2018</td>
</tr>
<tr>
<td>ASTM B103/B103M-2019</td>
</tr>
</tbody>
</table>

(remains unchanged)

Note: ASSE 6010, ASTM B103/B103M, and ASTM E84 meet the requirements for mandatory referenced standards in accordance with Section 3-3.7.1 of IAPMO's Regulations Governing Committee Projects.

SUBSTANTIATION:
Corrugated medical tubing (CMT) is a listed product that significantly reduces the number of fittings required to install medical gas systems and improves the seismic resiliency of those systems. This proposal will add CMT language that currently exists in the 2018 and 2021 editions of the NFPA 99 Health Care Facilities Code to Chapter 13, and add corrugated medical tubing to the list of products available for use in constructing medical gas systems. The proposal also requires CMT installation be performed by an ASSE qualified installer.
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.

(renumber remaining sections)

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 discharge to a mulch basin for single-family and multi-family dwellings. Gray water shall not be used to irrigate root crops or food crops intended for human consumption that 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\(^7\)

<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 higher 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 (96 50 L) per day/occupant |
   | Lavatories                        | 4 gallons (15 L) per day/occupant         |
   | Laundry                           | 46 10 gallons (57 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>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>35</td>
<td>4.0</td>
</tr>
<tr>
<td>Sandy-loam</td>
<td>40</td>
<td>2.6</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>1.1</td>
</tr>
<tr>
<td>Clay with small amounts of sand or gravel</td>
<td>120</td>
<td>0.8</td>
</tr>
</tbody>
</table>

**TABLE 1504.2**
DESIGN OF SIX-TYPICAL SOILS ABSORPTION CAPACITY

<table>
<thead>
<tr>
<th>SOIL CLASS AND TEXTURES</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>Sandy Loam (Group A) (Textures: sand, loamy sand, sandy loam)</td>
<td>11.9</td>
</tr>
<tr>
<td>Loam (Group B) (Textures: loam, silt loam)</td>
<td>4.5</td>
</tr>
<tr>
<td>Sandy Clay Loam (Group C) (Textures: Sandy clay loam)</td>
<td>3.0</td>
</tr>
<tr>
<td>Clay Loam (Group D) (Textures: clay loam, silty clay loam, sandy clay, silty clay, clay)</td>
<td>0.9</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)
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.
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
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>

(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>

(Note: 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.
Proposals

Item #: 257

UPC 2024  Section: 1501.7, K 101.7, Table 1701.1, Table 1701.2

SUBMITTER: Karan Kapila
Self

RECOMMENDATION:
Revise text

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 NSF 350 shall apply. The EPA/625/R-04/108 EPA/600/R-12/618 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.

K 101.7 Minimum Water Quality Requirements. The minimum water quality for potable rainwater catchment systems shall comply with the applicable water quality requirements as determined by the Authority Having Jurisdiction. In the absence of water quality requirements, the guidelines EPA/625/R-04/108 EPA/600/R-12/618 contains recommended water reuse guidelines to assist regulatory agencies develop, revise, or expand alternate water source water quality standards.

TABLE 1701.1
REFERENCED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
</table>

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>
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<tbody>
<tr>
<td>EPA/600/R-12/618-2012</td>
<td>Guidelines for Water Reuse</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>

Note: Portions of the table not shown remain unchanged.

363
SUBSTANTIATION:
The above revisions reflect the latest edition (title) to the EPA standard (Guidelines for Water Reuse) that is referenced in Table 1701.1 and Table 1701.2. EPA/600/R-12/618-2012 is the latest edition of EPA/625/R04-108-2004. Since the latest standard edition is being updated in Table 1701.1 and being removed from Table 1701.2 since it is used in the body of the code. Additionally, two sections (1501.7 and K 101.7) are being revised to show the latest edition of the Guidelines for Water Reuse standard. All provisions remain the same, this is just a clean up for the latest document.
1502.4 Separation Requirements. Underground alternate water source service piping other than gray water shall be separated from the building sewer in accordance with this code. Treated nonpotable water pipes carrying treated nonpotable water shall be permitted to be run or laid in the same trench as potable water pipes with a 12 inch (305 mm) minimum vertical and horizontal separation where both pipe materials are approved for use within a building. Where horizontal piping materials do not comply with this requirement, the minimum separation shall be increased to 60 inches (1524 mm). The potable water piping shall be installed at an elevation above the treated nonpotable water piping.

SUBSTANTIATION:
The change clarifies that pipes are not “treated non potable water.” They carry/distribute treated non-potable water. This change is needed to remove ambiguous language and add clarity to the intent of the section.
Proposals

Item #: 259
UPC 2024  Section: 1603.21

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Revise text

1603.0 Design and Installation.

**1603.21 1503.2.4 Rainwater Diversion Valves.** Rainwater diversion valves ranging from 6 inches (150 mm) to 12 inches (300 mm) in diameter shall comply with IAPMO IGC 352. Valves shall be accessible and include a filter located upstream of the valve when required.

SUBSTANTIATION:
Section 1503.2.4 should be moved to Chapter 16 as a sub-section of Section 1603.0 because it provides testing standards and installation requirements specifically for rainwater diversion valves. It does not address non-potable gray water or reclaimed water installations.
Proposals

Item #: 260
UPC 2024  Section: 1505.5

SUBMITTER: Bruce A Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Add new text

1505.0 Reclaimed (Recycled) Water Systems.

1505.5 Water Pressure. Reclaimed (recycled) water systems supplying water to water closets, urinals, and trap
primers shall be capable of delivering not less than 15 pounds-force per square inch (psi) (103 kPa) residual
pressure at the highest and most remote outlet served. Where the water pressure in the reclaimed water supply
system within the building exceeds 80 psi (552 kPa), a pressure reducing valve reducing the pressure to 80 psi (552
kPa) or less to water outlets in the building shall be installed.

(renumber remaining sections)

SUBSTANTIATION:
The Code does not address a minimum or maximum water pressure in Chapter 15, Section 1505.0 for off-site
treated reclaimed water. These systems are used to supply water to water closets and urinals, and in some cases
exterior hose bibbs and should be required to meet the same requirements as those found in Chapter 6 for potable
water systems.
Proposals

Item #: 261
UPC 2024 Section: 1506.1

SUBMITTER: Garry Sato
Greensmart Sustainable Concepts

RECOMMENDATION:
Revise text

1506.0 On-Site Treated Nonpotable Water Systems.
1506.1 General. The provisions of this section shall apply to the installation, construction, alteration, and repair of onsite treated nonpotable water systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, above and belowground irrigation, industrial or commercial cooling or air conditioning, and other uses approved by the Authority Having Jurisdiction.

Nonpotable water sources that shall be permitted for collection for re-use in on-site treated nonpotable water systems include rainwater, air conditioner condensate, cooling tower blow-down water, fire pump test water, foundation drainage, swimming pool backwash, steam system condensate, fluid cooler discharge water, ice maker discharge water, food steamer discharge water, combination oven discharge water, industrial process water, and other sources approved by the Authority Having Jurisdiction.

SUBSTANTIATION:
The proposed revision will give updated clarity and uniformity, as there have been new codes and regulations put in place in various other regions specifically relating to sources and uses of "on-site treated nonpotable water" since the last publication.
Proposals

Item #: 262
UPC 2024  Section: 1506.5

SUBMITTER: Bruce A. Pfeiffer
Retired - City of Topeka

RECOMMENDATION:
Add new text

1506.0 On-Site Treated Nonpotable Water Systems.

1506.5 Water Pressure. On-site treated non-potable water systems supplying water to water closets, urinals, and trap primers shall be capable of delivering not less than 15 pounds-force per square inch (psi) (103 kPa) residual pressure at the highest and most remote outlet served. Where the water pressure in the on-site treated non-potable water supply system within the building exceeds 80 psi (552 kPa), a pressure reducing valve reducing the pressure to 80 psi (552 kPa) or less to water outlets in the building shall be installed.

(renumber remaining sections)

SUBSTANTIATION:
The Code does not address a minimum or maximum water pressure in Chapter 15, Section 1506.0 for on-site treated non-potable water systems. These systems are used to supply water to water closets and urinals and should be required to meet the same requirements as those found in Chapter 6 for potable water systems.
Proposals

Item #: 263
UPC 2024  Section: 1506.7, 1603.16, K 101.4.1, K 104.4

SUBMITTER: Karan Kapila  Self

RECOMMENDATION:
Revise text

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 and labeled (third-party certified) by a listing agency (accredited conformity assessment body) or approved for the intended application. Devices or equipment used to treat on-site treated nonpotable water for use in the water closet and urinal flushing, surface irrigation, and similar applications shall comply with NSF 350 or approved by the Authority Having Jurisdiction.

1603.16 Water Quality Devices and Equipment. Devices and equipment used to treat rainwater to maintain the minimum water quality requirements determined by the Authority Having Jurisdiction shall be listed or and labeled (third-party certified) by a listing agency (accredited conformity assessment body) and approved for the intended application.

K 101.4.1 Plumbing Materials and Systems. Pipe, pipe fittings, traps, fixtures, material, and devices used in a potable rainwater system shall be listed or and labeled (third-party certified) by a listing agency (accredited conformity assessment body) and shall be in accordance with approved applicable recognized standards referenced within this code, and shall be free from defects. Unless otherwise provided for in this appendix, 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.

K 104.4 Water Quality Devices and Equipment. Devices and equipment used to treat rainwater to maintain the minimum water quality requirements determined by the Authority Having Jurisdiction shall be listed or and labeled (third-party certified) by a listing agency (accredited conformity assessment body) and approved for the intended application.

SUBSTANTIATION:
This proposal changes “listed or labeled” to “listed and labeled” to clarify the intention of the language. The phrase “listed and labeled” is found 6 other times in the UPC. This will avoid confusion and conflict within the code.
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 1507.7
LOG REDUCTION TARGETS FOR 10⁻⁴ INFECTIONS PER PERSON PER YEAR BENCHMARKS FOR BLACKWATER 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>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>
<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.

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.

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### Chapter 2 Definitions

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

**205.0 Challenge Test.** The evaluation of a unit treatment process for pathogen 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 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>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<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 1507.11(2)</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.

**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-log_{10} reduction equates to 90% removal, 2-log_{10} reduction to 99% removal, 3-log_{10} reduction to 99.9% removal, and so on. The treatment requirements developed using the risk-based methodology in this case are called log reduction targets, or LRTs. The LRTs were developed using a Quantitative Microbial Risk Assessment (QMRA). QMRA is a scientific approach to estimating the potential human health risks associated with exposure to microbial hazards (in this case, human pathogenic viruses, bacteria, and protozoa). LRTs for blackwater and stormwater reuse for unrestricted irrigation and toilet flushing were developed based on the annual risk level of 10-4 infections per person per year. Unit treatment processes that are effective at removing and/or inactivating pathogens can be used to meet the LRTs. In most cases, several unit processes are needed in series to provide sufficient treatment. The ability of unit processes to provide a certain level of treatment is verified through the use of ongoing monitoring and, in some cases, validation. For some unit processes, validation is critical to determine how the process can be used to achieve the LRTs. The AWTG also proposes to incorporate a monitoring approach for blackwater and stormwater systems that aligns with the research. The framework for monitoring deviates from traditional approaches of monitoring fecal indicator organisms (FIOS) in grab samples because there are recognized limitations of using FIOS. The primary limitation of FIO monitoring is that it cannot be done continuously to ensure safe water is delivered to the end use at all times. Rather, the AWTG is proposing continuous water quality monitoring of surrogate parameters such as.
turbidity, residual chlorine, ultraviolet transmittance, and others to verify that treatment processes are operating as designed.

Discussion: The AWTG supports the use of a health risk-based approach to guide treatment and design requirements for blackwater and stormwater systems because it ensures that systems implemented using this framework are safe and reliable. The requirements being proposed are intended to ensure that public health is protected while still allowing for flexibility in design, as it does not prescribe that specific treatment processes must be used. It is timely that AWTG is proposing these requirements because several states have recently moved forward to adopt the risk-based framework at the state level. Much of this work has been driven by the work of the National Blue Ribbon Commission for Onsite 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.

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 Contribution惭</td>
<td>5.0</td>
<td>4.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Ornamental plant irrigation/dust suppression</td>
<td>5.5</td>
<td>5.5</td>
<td>5.0</td>
</tr>
<tr>
<td>Indoor Use</td>
<td>3.0</td>
<td>2.5</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Stormwater with less than or equal to 0.1% fecal contamination contribution2

<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>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:
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>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>Visual Non-detectable</td>
</tr>
<tr>
<td>Oily Film and Foam</td>
<td>NA</td>
<td>4</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;
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\textsubscript{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.

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\textsubscript{10} Reduction. The removal of a pathogen or surrogate in a unit process expressed in log\textsubscript{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\textsubscript{10} Reduction Target (LRT). The log\textsubscript{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 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>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>

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...
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 riskbased 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, 55 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 riskbased 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 (18,927 L) where the tank is supported directly upon grade and the ratio of height to width (or diameter) does not exceed 2 to 1.
(2) A person registered or licensed to perform plumbing design work is not required to design rainwater catchment 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 (18,927 L) where the tank is supported directly upon grade and the ratio of height to width (or diameter) does not exceed 2 to 1 and it does not require electrical power or a make-up water supply connection.
(2) A plumbing permit is not required for rainwater catchment systems for single family dwellings where 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 1603.14.

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) – (49) (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.
Proposals

Item #: 267

UPC 2024  Section: 1603.21

SUBMITTER: Garry Sato
Greensmart Sustainable Concepts

RECOMMENDATION:
Add new text

1603.0 Design and Installation.

1603.21 Rainwater Diversion Valves. For gravity fed, non-pressurized rainwater collection systems. Rainwater diversion valves shall comply with IAPMO PS 59 or IAPMO IGC 352. The valve shall be accessible and include a filter located upstream of the valve when required.

Note: IAPMO IGC 352 and IAPMO PS 59 meet 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 IGC 352 and IAPMO PS 59 standards cover valves designed to divert rainwater or storm water. IAPMO PS 59 covers valves ranging from 2-inches through 4-inches in diameter. IAPMO IGC 352 covers rainwater systems ranging from 6-inches through 12-inches in diameter and addresses the need for large diameter valves for use with alternate water source systems, which is not addressed in IAPMO PS 59. Third party tested and approved rainwater diversion valves fill a current unmet need in the commercial building industry.
Proposals

Item #: 268
UPC 2024  Section: 1603.6, Table 1701.1

SUBMITTER: David Lentz
Infiltrator Water Technologies

RECOMMENDATION:
Revise text

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.

1603.43 Rainwater Catchment Collection Surfaces. (remaining text unchanged)
1603.54 Minimum Water Quality. (remaining text unchanged)
1603.65 Rainwater Storage Tanks. Rainwater storage tanks shall be constructed comply with IAPMO Z1002 and be installed in accordance with Section 1603.3 and Section 1603.76 through Section 1603.1312.

1603.76 Location. (remaining text unchanged)

(renumber remaining sections)

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAPMO Z1002-2020</td>
<td>Rainwater Harvesting Tanks</td>
<td>Rainwater Tanks</td>
<td>1603.5</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

Note: IAPMO Z1002 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 proposed changes add the appropriate standard for rainwater harvesting tanks in Section 1603.6. The current language in the UPC only covers installation provisions for the tanks. In contrast, IAPMO Z1002 contains material and performance requirements as well as testing procedures to ensure the tanks are safe for use in their intended application. Furthermore, the construction requirements in Section 1603.3 are being proposed for removal as these requirements are less stringent than the construction requirements for tanks specified in the proposed reference to IAPMO Z1002. Additionally, the requirements in Section 1603.3 become redundant with the addition of IAPMO Z1002.
Proposals

Item #: 269
UPC 2024  Section: Table A 103.1

SUBMITTER: Bob Adler (Self), Thura Zin (Murray Company, ASPE - Los Angeles Chapter, IAMPO)

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>Sinks</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Bar</td>
<td>1/2</td>
<td>1.0</td>
<td>2.0</td>
<td>–</td>
</tr>
<tr>
<td>Clinical Faucet</td>
<td>1/2</td>
<td>–</td>
<td>3.0</td>
<td>–</td>
</tr>
<tr>
<td>Clinical Flushometer Valve with or without faucet</td>
<td>1</td>
<td>–</td>
<td>8.0</td>
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<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>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
Bob Adler:
If you take a look at Table 610.3, it lumps a domestic kitchen sink with or without a dishwasher together for 1.5 wsfu as well as having a load for an individual domestic dishwasher of 1.5. However, when using Appendix A, Table A 610.3 it does not have the option for a combined domestic kitchen sink and domestic dishwasher, it only has the domestic dishwasher 1.5 wsfu and then the domestic kitchen sink at 1.5 wsfu. The difference between Chapter 6 and Appendix A for the wsfu load for a domestic kitchen sink and dishwasher was an oversight when it was changed in Chapter 6 in 2012. Appendix A should have been changed with Chapter 6, meaning that the domestic dishwasher should be combined with the domestic kitchen sink for a total of 1.5 wsfu as well as the option of the “stand alone” domestic dishwasher.

Thura Zin:
In Table 610.3 Water Supply Fixture Units (WSFU) and Minimum Fixture Branch Pipe Size, Sink for Kitchen, domestic with or without dishwasher has 1.5 WSFU for Private or Public. Appendix A Table A 103 should be the same as Chapter 6 table 610.3 for "kitchen, domestic."
If some City allows to use Appendix A for sizing, we are over sizing the hot water line for apartment complex.
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.
B 101.2 General Requirements. Combination waste and vent systems, \textit{(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, \textit{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.

\textbf{SUBSTANTIATION:}\nThis is an editorial change that clarifies the intent of Appendix B. Relocating the exiting language to the beginning will clarify the general requirements.
Proposals

Item #: 272

UPC 2024  Section: C 201.1, E 201.1, F 201.1, L 101.2, L 201.1, N 102.1

SUBMITTER: Phillip H Ribbs
PHR Consultants

RECOMMENDATION:
Revise text

(below shown for reference only)

201.0 General.
201.1 Applicability. For the purpose of this code, the following terms have the meanings indicated in this chapter.
   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
   code to avoid misunderstanding.

202.0 Definition of Terms.
202.1 General. The definitions of terms are arranged alphabetically according to the first word of the term.

APPENDICES
The appendices are intended to supplement the provisions of the installation requirements of this code. The
definitions in Chapter 2 are also applicable to the appendices.

C 201.0 Definitions.
C 201.1 General. For the purposes of this appendix, the following definitions shall apply:

E 201.0 Definitions.
E 201.1 General. For the purposes of this appendix, the following definitions shall apply:

F 201.0 Definitions.
F 201.1 General. For the purposes of this appendix, the following definitions shall apply:

L 201.0 Definitions.
L 201.1 General. For the purposes of this appendix, the following definitions shall apply:

N 102.0 Definitions.
N 102.1 General. For the purposes of this appendix, the following definitions shall apply:

SUBSTANTIATION:
The above change intends to correlate the opening statement for definitions used throughout the code. Currently
the appendices’ opening statement for definitions are different. The change updates all appropriate sections to the
same statement to clarify that the definitions in the appendices are specific to the appendices. The main appendix
statement already clarifies that Chapter 2 definitions apply to all sections of the code. Furthermore, Appendix L is
being modified to match the other appendices as the statement is a repeat of what is in Chapter 2.
Proposals

Item #: 273

UPC 2024 Section: E 403.7, Table 1701.2, Table L 503.3.2

SUBMITTER: Karan Kapila  
Self

RECOMMENDATION:
Revise text

E 403.7 Plastic Piping. Plastic piping shall only be used underground and shall meet the requirements of ASTM D2513 or ASTM D2517, as well as the design pressure and design limitations of 49 CFR (Section 192.123), and shall otherwise conform to the installation requirements thereof. [NFPA 501A:4.3.6.3]

Table L 503.3.2
(portions of table not shown remains unchanged)

Notes:
(1-6) remains unchanged
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.

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title 49, Code of Federal Regulations, Part 49 CFR 192</td>
<td>Transportation of Natural and Other Gas by Pipeline: Minimum Federal Standards</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
The proposed change cleans up the UPC by using the same formatting when calling out CFR standards. There are 7 other instances that use this format for CFR standards. This cleanup will assist the end user locate these standards. This is also how the standards are called out in other documents.
Proposals

Item #: 274
UPC 2024 Section: E 403.13

SUBMITTER: IAPMO Staff - Updates Extracts
NFPA 54 Extract Update

RECOMMENDATION:
Revise text

E 403.13 Oil Supply Connections. Oil supply connections at manufactured home sites, where provided from a centralized oil distribution system, shall be located and arranged to permit attachment to a manufactured home utilizing the stand. [NFPA 501A:4.3.11.1] The installation of such facilities shall comply with the following requirements:
(1) The main distribution pipeline shall be permitted to be connected to a tank or tanks having an aggregate capacity not exceeding 20,000 gallons (75,708 L) at a point below the liquid level.
(2) Accessible internal or external shut-off valve shall be installed in the piping as close as practicable to the tank.
(3) If external and aboveground, the shut-off valve and its tank connections shall be made of steel.
(4) Connections between the tank(s) and the main pipeline shall be made with double swing joints or flexible connectors, or shall otherwise be arranged to permit the tank(s) to settle without damaging the system.
(5) If located aboveground, the connections specified in Section E 403.13(4) shall be located within the diked area.
(6) A readily accessible and identified manual shut-off valve shall be installed either inside or outside of the structure in each branch supply pipeline that enters a building, mobile home, travel trailer, or other structure. If outside, the valve shall be protected from weather and damage. If inside, the valve shall be located directly adjacent to the point at which the supply line enters the structure. If outside, the valve shall be protected from weather and damage.
(7) A device shall be provided in the supply line at or ahead of the point where it enters the interior of the structure that will automatically shut off the oil supply, if the supply line between this device and the appliance is broken. This device shall be located on the appliance side of the manual shut-off valve required in Section E 403.13(6) and shall be solidly supported and protected from damage.
(8) Means shall be provided to limit the oil pressure at the appliance inlet to a maximum gauge pressure of 3 pounds-force per square inch gauge (psig) (21 kPa). If a pressure-reducing valve is used, it shall be a type approved for the service.
(9) A device shall be provided that will automatically shut off the oil supply to the appliance if the oil pressure at the appliance inlet exceeds a gauge pressure of 8 psig (55 kPa). This device shall not be required under either of the following conditions:
   (a) Where the distribution system is supplied from a gravity tank and the maximum hydrostatic head of oil in the tank is such that the oil pressure at the appliance inlet will not exceed a gauge pressure of 8 psig (55 kPa).
   (b) Where a means is provided to automatically shut off the oil supply if the pressure-regulating device provided in accordance with Section E 403.13(8) fails to regulate the pressure as required.
(10) Only appliances equipped with primary safety controls specifically listed for the appliance shall be connected to a centralized oil distribution system. [NFPA 31:9.2.10 – 9.2.15]

SUBSTANTIATION:
The above sections have been revised to correlate with NFPA 31-2020 (latest version) in accordance with IAPMO’s Regulations Governing Committee Projects (Extract Guidelines).
Proposals

Item #: 275

UPC 2024  Section: F 1101.2

SUBMITTER: IAPMO Staff - Update Extracts
ASME B31.1 Extract Update

RECOMMENDATION:
Revise text

F 1101.0 System Assembly Requirements.

F 1101.2 Welding Requirements. Prior to and during the welding of sections of tubing, a continuous, regulated dry nitrogen or argon purge at 3 psi (21 kPa) shall be maintained to eliminate contamination with products of the oxidation or welding flux. The purge shall commence not less than 2 minutes prior to welding operations and continue until the welded joint is at ambient temperature. Welding procedures shall comply with the following requirements:
(1) Qualification of the WPS to be used, and of the performance of welders and operators, is required and shall comply with the requirements of ASME B31.1.
(2) No welding shall be done if there is impingement of rain, snow, sleet, or high wind on the weld area.
(3) Tack welds permitted to remain in the finished weld shall be made by a qualified welder. Tack welds made by an unqualified welder shall be removed. Tack welds that remain shall be made with an electrode and WPS — which that is the same as or equivalent to the electrode and WPS to be used for the first pass. The stopping and starting ends shall be prepared by grinding or other means so that they can be satisfactorily incorporated into the final weld. Tack welds that have cracked shall be removed.
(4) CAUTION: Arc strikes outside the area of the intended weld shall be avoided on a base metal. Arc strikes made outside of the weld joint area shall be removed and the surface visually examined. The surface shall also be examined by the liquid penetrant or magnetic particle method when the material is P-No. 4, P-No. 5A, P-No. 5B, or P-No. 15E, [ASME B31.1:127.4.1]

SUBSTANTIATION:
The above sections have been revised to correlate with ASME B31.1-2020 (latest version) in accordance with IAPMO’s Regulations Governing Committee Projects (Extract Guidelines).
Proposals

Item #: 276
UPC 2024  Section: Appendix G

SUBMITTER: IAPMO Staff - Update Extracts
NFPA 54 Extract Update

RECOMMENDATION:
Revise text

APPENDIX G
SIZING OF VENTING SYSTEMS
(The content of this Appendix is based on Annex F of NFPA 54)

G 101.2 Examples Using Single Appliance Venting Tables. See Figure G 101.2(1) through Figure G 101.2(14).  
[NFPA 54:F.1]
Table 510.2(4) is used when sizing single-wall metal vent connectors attached to a tile-lined masonry chimney.

Notes:
1. A is the equivalent cross-sectional area of the tile liner.
2. Each appliance can be either Category I draft hood-equipped or fan-assisted type.

**FIGURE G 101.2(9)**
MASONRY CHIMNEY SERVING TWO OR MORE APPLIANCES WITH SINGLE-WALL METAL VENT CONNECTORS

Asbestos cement Type B or single-wall metal pipe vent serving two or more draft hood-equipped appliances. [See Table 510.2(3)]

**FIGURE G 101.2(10)**
ASBESTOS CEMENT TYPE B OR SINGLE-WALL METAL VENT SYSTEM SERVING TWO OR MORE DRAFT HOOD-EQUIPPED APPLIANCES

Example: Offset common vent

Note: This is an illustration of a typical offset vent. Different appliance, vent connector, or vent types are possible. [See Section 516.1 and Section 310.2]
G 101.3 Example 1: Single Draft Hood-Equipped Appliance. An installer has a 120 000 British thermal units per hour (Btu/h) (35 kW) input appliance with a 5 inch (127 mm) diameter draft hood outlet that needs to be vented into a 10 foot (3048 mm) high Type B vent system. What size vent shall be used assuming: (1) a 5 foot (1524 mm) lateral single-wall metal vent connector is used with two 90 degree (1.57 rad) elbows or (2) a 5 foot (1524 mm) lateral single-wall metal vent connector is used with three 90 degree (1.57 rad) elbows in the vent system? (See Figure G 101.3)

Solution:
Table 510.1.2(2) should be used to solve this problem because single-wall metal vent connectors are being used with a Type B vent, as follows:

1. Read down the first column in Table 510.1.2(2) until the row associated with a 10 foot (3048 mm) height and 5 foot (1524 mm) lateral is found. Read across this row until a vent capacity greater than 120 000 Btu/h (35 kW) is located in the shaded columns labeled NAT Max for draft hood-equipped appliances. In this case, a 5 inch (127 mm) diameter vent has a capacity of 122 000 Btu/h (35.7 kW) and can be used for this application.

2. If three 90 degree (1.57 rad) elbows are used in the vent system, the maximum vent capacity listed in the tables must be reduced by 10 percent. This implies that the 5 inch (127 mm) diameter vent has an adjusted capacity of only 110 000 Btu/h (32 kW). In this case, the vent system must be increased to 6 inches (152 mm) in diameter. See the following calculations:

   \[122\,000\,\text{Btu/h} (35.7\,\text{kW}) \times 0.90 = 110\,000\,\text{Btu/h} (32\,\text{kW})\] for 5 inch (127 mm) vent

   From Table 510.1.2(2), select 6 inch (152 mm) vent.

   \[186\,000\,\text{Btu/h} (54.5\,\text{kW}) \times 0.90 = 167\,000\,\text{Btu/h} (49\,\text{kW})\]

This figure is greater than the required 120 000 Btu/h (35 kW). Therefore, use a 6 inch (152 mm) vent and connector where three elbows are used. [NFPA 54:F.1.1]

G 101.4 Example 2: Single Fan-Assisted Appliance. An installer has an 80 000 Btu/h (23.4 kW) input fan-assisted appliance that must be installed using 10 feet (3048 mm) of lateral connector attached to a 30 foot high (9144 mm) Type B vent. Two 90-degree (1.57 rad) elbows are needed for the installation. Can a single-wall metal vent connector be used for this application? (See Figure G 101.4)

Solution:
Table 510.1.2(2) refers to the use of single-wall metal vent connectors with Type B vent. In the first column find the row...
associated with a 30 foot (9144 mm) height and a 10 foot (3048 mm) lateral. Read across this row, looking at the FAN Min and FAN Max columns, to find that a 3 inch (76 mm) diameter single-wall metal vent connector is not recommended. Moving to the next larger size single-wall connector [4 inch (102 mm)] we find that a 4 inch (102 mm) diameter single-wall metal connector has a recommended minimum vent capacity of 91 000 Btu/h (26.7 kW) and a recommended maximum vent capacity of 144 000 Btu/h (42.2 kW). The 80 000 Btu/h (23.4 kW) fan-assisted appliance is outside this range, so the conclusion is that a single-wall metal vent connector cannot be used to vent this appliance using 10 feet (3048 mm) of lateral for the connector.

However, if the 80 000 Btu/h (23.4 kW) input appliance could be moved to within 5 feet (1524 mm) of the vertical vent, a 4 inch (102 mm) single-wall metal connector could be used to vent the appliance. Table 510.1.2(2) shows the acceptable range of vent capacities for a 4 inch (102 mm) vent with 5 feet (1524 mm) of lateral to be between 72 000 Btu/h (21.1 kW) and 157 000 Btu/h (46 kW).

If the appliance cannot be moved closer to the vertical vent, a Type B vent could be used as the connector material. In this case, Table 510.1.2(1) shows that, for a 30 foot (9144 mm) high vent with 10 feet (3048 mm) of lateral, the acceptable range of vent capacities for a 4 inch (102 mm) diameter vent attached to a fan-assisted appliance is between 37 000 Btu/h (10.8 kW) and 150 000 Btu/h (44 kW).

Solution: Table 510.1.2(1) is used in the case of an all Type B Vent system. However, Table 510.1.2(1) does not have an entry for a height of 12 feet (3658 mm), and interpolation must be used. Read down the 4 inch (102 mm) diameter NAT Max column to the row associated with 10 foot (3048 mm) height and 5 foot (1524 mm) lateral to find the capacity value of 77 000 Btu/h (22.6 kW). Read further down to the 15 foot (4572 mm) height, 5 foot (1524 mm) lateral row to find the capacity value of 87 000 Btu/h (25.5 kW). The difference between the 15 foot (4572 mm) height capacity value and the 10 foot (3048 mm) height capacity value is 10 000 Btu/h (3 kW). The capacity for a vent system with a 12 foot (3658 mm) height is equal to the capacity for a 10 foot (3048 mm) height plus two-fifths of the difference between the 10 foot (3048 mm) and 15 foot (4572 mm) height values, or 77 000 Btu/h (22.6 kW) + \( \frac{2}{5} \times 10 000 \) Btu/h (3 kW) = 81 000 Btu/h (23.7 kW). Therefore, a 4 inch (102 mm) diameter vent can be used in the installation.

Solution: Table 510.2(2) should be used to size single-wall metal vent connectors attached to Type B vertical vents. In the vent connector capacity portion of Table 510.2(2), find the row associated with a 30 foot (9144 mm) vent height. For a 2 foot (610 mm) rise on the vent connector for the water heater, read the shaded columns for draft hood-equipped appliances.
to find that a 3 inch (76 mm) diameter vent connector has a capacity of 37 000 Btu/h (10.8 kW). Therefore, a 3 inch (76 mm) single-wall metal vent connector can be used with the water heater. For a draft hood-equipped furnace with a 3 foot (914 mm) rise, read across the appropriate row to find that a 5 inch (127 mm) diameter vent connector has a maximum capacity of 120 000 Btu/h (35 kW) (which is too small for the furnace) and a 6 inch (152 mm) diameter vent connector has a maximum vent capacity of 172 000 Btu/h (50 kW). Therefore, a 6 inch (152 mm) diameter vent connector should be used with the 150 000 Btu/h (44 kW) furnace. Because both vent connector, horizontal lengths are less than the maximum lengths listed in Section 510.2.1; the table values can be used without adjustments.

In the common vent capacity portion of Table 510.2(2), find the row associated with a 30 foot (9144 mm) vent height and read over to the NAT + NAT portion of the 6 inch (152 mm) diameter column to find a maximum combined capacity of 257 000 Btu/h (75 kW). Since the two appliances total only 185 000 Btu/h (54 kW), a 6 inch (152 mm) common vent can be used. [NFPA 54:F.2.1]

In this case, a 35 000 Btu/h (10.3 kW) input draft hood-equipped water heater with a 4 inch (102 mm) diameter draft hood outlet, 2 feet (610 mm) of connector rise, and 4 feet (1219 mm) of horizontal length is to be common vented with a 100 000 Btu/h (29 kW) fan-assisted furnace with a 4 inch (102 mm) diameter flue collar, 3 feet (914 mm) of connector rise, and 6 feet (1829 mm) of horizontal length. The common vent consists of a 30 foot (9144 mm) height of Type B vent. What are the recommended vent diameters for each connector and the common vent? The installer would like to use a single-wall metal vent connector. (See Figure G 101.7)

Solution:
Water Heater Vent Connector Diameter. Since the water heater vent connector, horizontal length of 4 feet (1219 mm) is less than the maximum value listed in Table 510.2(2), the venting table values can be used without adjustments. Using the Vent Connector Capacity portion of Table 510.2(2), read down the Total Vent Height ($H$) column to 30 feet (9144 mm) and read across the 2 feet (610 mm) Connector Rise ($R$) row to the first Btu/h rating in the NAT Max column that is equal to or greater than the water heater input rating. The table shows that a 3 inch (76 mm) vent connector has a maximum input rating of 37 000 Btu/h (10.8 kW). Although this rating is greater than the water heater input rating, a 3 inch (76 mm) vent connector is prohibited by Section 510.2.18. A 4 inch (102 mm) vent connector has a maximum input rating of 67 000 Btu/h (19.6 kW) and is equal to the draft hood outlet diameter. A 4 inch (102 mm) vent connector is selected. Since the water heater is equipped with a draft hood, there are no minimum input rating restrictions.
Furnace Vent Connector Diameter. Using the Vent Connector Capacity portion of Table 510.2(2), read down the Total Vent Height ($H$) column to 30 feet (9144 mm) and across the 3 feet (914 mm) Connector Rise ($R$) row. Because the furnace has a fan-assisted combustion system, find the first FAN Max column with a Btu/h rating greater than the furnace input rating. The 4 inch (102 mm) vent connector has a maximum input rating of 119 000 Btu/h (34.9 kW) and a minimum input rating of 85 000 Btu/h (24.9 kW). The 100 000 Btu/h (29 kW) furnace in this example falls within this range, so a 4 inch (102 mm) connector is adequate.

Because the furnace vent connector horizontal length of 6 feet (1829 mm) is less than the maximum value listed in Section 510.2.1; the venting table values can be used without adjustment. If the furnace had an input rating of 80 000 Btu/h (23.4 kW), a Type B vent connector would be needed in order to meet the minimum capacity limit.

Common Vent Diameter. The total input to the common vent is 135 000 Btu/h (40 kW). Using the Common Vent Capacity portion of Table 510.2(2), read down the Total Vent Height ($H$) column to 30 feet (9144 mm), and across this row to find the smallest vent diameter in the FAN + NAT column that has a Btu/h rating equal to or greater than 135 000 Btu/h (40 kW). The 4 inch (102 mm) common vent has a capacity of 132 000 Btu/h (39 kW) and the 5 inch (127 mm) common vent has a capacity of 202 000 Btu/h (59 kW). Therefore, the 5 inch (127 mm) common vent should be used in this example.

Summary: In this example, the installer can use a 4 inch (102 mm) diameter, single-wall metal vent connector for the water heater and a 4 inch (102 mm) diameter, single-wall metal vent connector for the furnace. The common vent should be a 5 inch (127 mm) diameter Type B vent.

G 101.8 Example 5(b): Common Venting into an Interior Masonry Chimney. In this case, the water heater and fan-assisted furnace of Example 5(a) are to be common-vented into a clay-tile-lined masonry chimney with a 30 foot (9144 mm) height. The chimney is not exposed to the outdoors below the roof line. The internal dimensions of the clay tile liner are nominally 8 inches (203 mm) by 12 inches (305 mm). Assuming the same vent connector heights, laterals, and materials found in Example 5(a), what are the recommended vent connector diameters, and is this an acceptable installation?

Solution:

Table 510.2(4) is used to size common venting installations involving single-wall connectors into masonry chimneys. Water Heater Vent Connector Diameter. Using Table 510.2(4), Vent Connector Capacity, read down the Total Vent Height ($H$) column to 30 feet (9144 mm), and read across the 2 feet (610 mm) Connector Rise ($R$) row to the first Btu/h rating in the NAT Max column that is equal to or greater than the water heater input rating. The table shows that a 3 inch (76 mm) vent connector has a maximum input of only 31 000 Btu/h (9 kW), while a 4 inch (102 mm) vent connector has a maximum input of 57 000 Btu/h (16.7 kW). A 4 inch (102 mm) vent connector must therefore be used.

Furnace Vent Connector Diameter. Using the Vent Connector Capacity portion of Table 510.2(4), read down the Total Vent Height ($H$) column to 30 feet (9144 mm) and across the 3 feet (914 mm) Connector Rise ($R$) row. Because the furnace has a fan-assisted combustion system, find the first FAN Max column with a Btu/h rating greater than the furnace input rating. The 4 inch (102 mm) vent connector has a maximum input rating of 127 000 Btu/h (37 kW) and a minimum input rating of 95 000 Btu/h (27.8 kW). The 100 000 Btu/h (29 kW) furnace in this example falls within this range, so a 4 inch (102 mm) connector is adequate.

Masonry Chimney. From Table G 101.8, the equivalent area for a nominal liner size of 8 inches (203 mm) by 12 inches (305 mm) is 63.6 square inches (0.041 m$^2$). Using Table 510.2(4), Common Vent Capacity, read down the FAN + NAT column under the Minimum Internal Area of Chimney value of 63 to the row for 30 foot (9144 mm) height to find a capacity value of 739 000 Btu/h (217 kW). The combined input rating of the furnace and water heater, 135 000 Btu/h (40 kW), is within this range, so a 5 inch (127 mm) common vent should be used.
kW), is less than the table value, so this is an acceptable installation.

Subsection 510.2.17 requires the common vent area to be no greater than seven times the smallest listed appliance categorized vent area, flue collar area, or draft hood outlet area. Both appliances in this installation have 4 inch (102 mm) diameter outlets. From Table G 101.8, the equivalent area for an inside diameter of 4 inches (102 mm) is 12.2 square inches (0.008 m²). Seven times 12.2 equals 85.4, which is greater than 63.6, so this configuration is acceptable. [NFPA 54:F.2.3]

G 101.9 Example 5(c): Common Venting into an Exterior Masonry Chimney. In this case, the water heater and fan-assisted furnace of Examples 5(a) and 5(b) are to be common-vented into an exterior masonry chimney. The chimney height, clay-tile-liner dimensions, and vent connector heights and laterals are the same as in Example 5(b). This system is being installed in Charlotte, North Carolina. Does this exterior masonry chimney need to be relined? If so, what corrugated metallic liner size is recommended? What vent connector diameters are recommended? (See Table G 101.8 and Figure 510.1.10)

Solution:

According to Section 510.2.20, Type B vent connectors are required to be used with exterior masonry chimneys. Use Table 510.2(8) and Table 510.2(9) to size FAN+NAT common venting installations involving Type B double-wall connectors into exterior masonry chimneys.

The local 99 percent winter design temperature needed to use Table 510.2(8) and Table 510.2(9) can be found in ASHRAE Handbook – Fundamentals. For Charlotte, North Carolina, this design temperature is 19°F (-7.2°C).
Chimney Liner Requirement. As in Example 5(b), use the 63 square inches (0.04 m²) Internal Area columns for this size clay tile liner. Read down the 63 square inches (0.04 m²) column of Table 510.2(8) to the 30 foot (9144 mm) height row to find that the combined appliance maximum input is 747 000 Btu/h (218.9 kW). The combined input rating of the appliances in this installation, 135 000 Btu/h (40 kW), is less than the maximum value, so this criterion is satisfied. Table 510.2(9), at a 19°F (-7.2°C) design temperature, and at the same vent height and internal area used earlier, shows that the minimum allowable input rating of a space-heating appliance is 470 000 Btu/h (137.7 kW). The furnace input rating of 100 000 Btu/h (29 kW) is less than this minimum value. So this criterion is not satisfied, and an alternative venting design needs to be used, such as a Type B vent shown in Example 5(a) or a listed chimney liner system shown in the remainder of the example.

According to Section 510.2.19, Table 510.2(1) or Table 510.2(2) is used for sizing corrugated metallic liners in masonry chimneys, with the maximum common vent capacities reduced by 20 percent. This example will be continued assuming Type B vent connectors.

Water Heater Vent Connector Diameter. Using Table 510.2(1) Vent Connector Capacity, read down the total Vent Height (H) column to 30 feet (9144 mm), and read across the 2 feet (610 mm) Connector Rise (R) row to the first Btu/hour rating in the NAT Max column that is equal to or greater than the water heater input rating. The table shows that a 3 inch (76 mm) vent connector has a maximum capacity of 39 000 Btu/h (11.4 kW). Although this rating is greater than the water heater input rating, a 3 inch (76 mm) vent connector is prohibited by Section 510.2.20. A 4 inch (102 mm) vent connector has a maximum input rating of 70 000 Btu/h (20.5 kW) and is equal to the draft hood outlet diameter. A 4 inch (102 mm) vent connector is selected.

Furnace Vent Connector Diameter. Using Table 510.2(1), Vent Connector Capacity, read down the total Vent Height (H) column to 30 feet (9144 mm), and read across the 3 feet (914 mm) Connector Rise (R) row to the first Btu/h rating in the FAN MAX column that is equal to or greater than the furnace input rating. The 100 000 Btu/h (29 kW) furnace in this example falls within this range, so a 4 inch (102 mm) connector is adequate.

Chimney Liner Diameter. The total input to the common vent is 135 000 Btu/h (40 kW). Using the Common Vent Capacity portion of Table 510.2(1), read down the total Vent Height (H) column to 30 feet (9144 mm) and across this row to find the smallest vent diameter in the FAN + NAT column that has a Btu/h rating greater than 135 000 Btu/h (40 kW). The 4 inch (102 mm) common vent has a capacity of 138 000 Btu/h (40.4 kW). Reducing the maximum capacity by 20 percent results in a maximum capacity for a 4 inch (102 mm) corrugated liner of 110 000 Btu/h (32 kW), less than the total input of 135 000 Btu/h (40 kW). So a larger liner is needed. The 5 inch (127 mm) common vent capacity listed in Table 510.2(1) is 210 000 Btu/h (62 kW), and after reducing by 20 percent is 168 000 Btu/h (49.2 kW). Therefore, a 5 inch (127 mm) corrugated metal liner should be used in this example.

Single Wall Connectors. Once it has been established that relining the chimney is necessary, Type B double-wall vent connectors are not specifically required. This example could be redone using Table 510.2(2) for single-wall vent connectors. For this case, the vent connector and liner diameters would be the same as found for Type B double-wall connectors.

**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 #: 277
UPC 2024 Section: H 301.1(5)

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 (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) - (4) (remaining text unchanged)
(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 calculated using Table H 201.1(2) with a 0.70 multiplier.

(below shown for reference only)

<table>
<thead>
<tr>
<th>TYPE OF SOIL</th>
<th>REQUIRED SQUARE FEET OF LEACHING AREA PER 100 GALLONS</th>
<th>MAXIMUM ABSORPTION CAPACITY IN GALLONS PER SQUARE FEET OF 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 or sandy clay</td>
<td>40</td>
<td>2.5</td>
</tr>
<tr>
<td>Clay with considerable sand or gravel</td>
<td>90</td>
<td>1.1</td>
</tr>
<tr>
<td>Clay with small amount of sand or gravel</td>
<td>120</td>
<td>0.8</td>
</tr>
</tbody>
</table>

For SI units: 1 square foot = 0.0929 m², 1 gallon = 3.785 L, 1 gallon per square foot = 40.7 L/m²

SUBSTANTIATION:
The proposal clarifies how the disposal area trench or bed size is calculated, but makes no change to the disposal area sizing. The problem is that California county environmental health department staff have expressed misunderstanding about how the 0.70 multiplier is applied to the required square feet area value in Table H 201.1(2). Specifically, questions arise regularly about whether the disposal area sizing should be made 70% of the size or 130% of the size of the gravel disposal area. By rearranging the sentence, the intent is to improve the reader’s ability to interpret the code provisions and calculate the size of the disposal area correctly.
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 (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. – (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).

(below shown for reference only)

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>
<th>MAXIMUM ABSORPTION CAPACITY IN GALLONS PER SQUARE FEET OF 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 or</td>
<td>40</td>
<td>2.5</td>
</tr>
</tbody>
</table>
Clay with considerable sand or gravel  

| Sandyclay   | 90  | 1.1 |

Clay with small amount of sand or gravel  

| Sandyclay   | 120 | 0.8 |

For SI units: 1 square foot = 0.0929 m², 1 gallon = 3.785 L, 1 gallon per square foot = 40.7 L/m²

**SUBSTANTIATION:**
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.
Proposals

Item #: 279
UPC 2024  Section: H 501.14, Table 1701.1, Table 1701.2

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 concrete, fiberglass-reinforced polyester, thermoplastic, and steel septic tanks shall comply with approved applicable standards IAPMO/ANSI Z1000 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.

SUBSTANTIATION:
The proposed changes add the appropriate standard for manufactured or prefabricated concrete, fiber-reinforced polyester, thermoplastic, and steel septic tanks. The current language does not provide a specific reference standard. However, ANSI and Standards Council of Canada standards are available to define requirements for manufactured or prefabricated septic tanks to ensure the tanks are safe for use in their application. This section of the code already specifies UL 70 for bituminous coated septic tanks, so the inclusion of IAPMO/ANSI Z1000-2019 for concrete, fiber-reinforced polyester, thermoplastic, and steel septic tanks would be a parallel addition to the existing code structure.
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.

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<th>DOCUMENT NUMBER</th>
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<th>APPLICATION</th>
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<tr>
<td>IAPMO IGC 262-2020</td>
<td>Corrugated Thermoplastic Tanks</td>
<td>DWV Components</td>
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</table>

(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.
Proposals

Item #: 281
UPC 2024  Section: H 601.1.1

SUBMITTER: David Lentz  
Infiltrator Water Technologies

RECOMMENDATION:
Add new text

H 601.0 Disposal Fields.  
H 601.1 Distribution Lines. (remaining text unchanged)

**H 601.1.1 Bundled Expanded Polystyrene Synthetic Aggregate Units.** Bundled expanded polystyrene synthetic aggregate units with an integrated distribution line consisting of perforated, corrugated high-density polyethylene pipe that complies with IAPMO IGC 276 shall be permitted.

**SUBSTANTIATION:**
The proposed change recognizes the method of constructing bundled expanded polystyrene synthetic aggregate (EPS) units complying with IAPMO IGC 276, which includes an integrated perforated, corrugated high-density polyethylene pipe conforming with ASTM F667. Section H 201.1 requires that wastewater entering a disposal field must first flow through a conforming septic tank, where primary treatment occurs, separating liquid and solids and producing a clarified effluent (see page 1 of Supporting Document - USEPA fact sheet). Clarifying effluent in the septic tank prior to discharge to the disposal field eliminates the potential for solids to become trapped in the disposal field pipe corrugations and obstruct flow within the EPS unit. Section 310.5 describes specific instances when piping may exceed the normal frictional resistance to flow. The proposed subsection represents an additional allowable instance when normal frictional resistance to flow may occur. By conveying only liquid in the EPS unit pipe via primary treatment in the septic tank, an integrated perforated, corrugated high-density polyethylene pipe conforming with ASTM F667 can successfully distribute wastewater within the disposal field.

Supporting document(s) has been provided to the Technical Committee for review.
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.
APPENDIX J
COMBINATION OF INDOOR AND OUTDOOR COMBUSTION AND VENTILATION OPENING DESIGN
(The content of this Appendix is based on Annex I of NFPA 54)

J 101.0 General.
J 101.1 Applicability. This appendix provides general guidelines for the sizing of combination indoor and outdoor combustion and ventilation air openings.
J 101.2 Example of Combination Indoor and Outdoor Combustion Air Opening. Determine the required combination of indoor and outdoor combustion air opening sizes for the following appliance installation example.

Example Installation: A fan-assisted furnace and a draft-hood-equipped water heater with the following inputs are located in a 15 foot by 30 foot (4572 mm by 9144 mm) basement with an 8 foot (2438 mm) ceiling. No additional indoor spaces can be used to help meet the appliance combustion air needs.

Fan-Assisted Furnace Input: 100 000 British thermal units per hour (Btu/h) (29 kW)
Draft Hood-Equipped Water Heater Input: 40 000 Btu/h (11.7 kW)

Solution:
(1) Determine the total available room volume. Appliance room volume:
15 feet by 30 feet (4572 mm by 9144 mm) with an 8 foot (2438 mm) ceiling = 3600 cubic feet (101.94 m$^3$)

(2) Determine the total required volume. The standard method to determine combustion air is used to calculate the required volume. The combined input for the appliances located in the basement is calculated as follows:

100 000 Btu/h (29 kW) + 40 000 Btu/h (11.7 kW) = 140 000 Btu/h (41 kW)

The standard method requires that the required volume be determined based on 50 cubic feet per 1000 Btu/h (4.83 m$^3$/kW). Using Table J 101.2, the required volume for a 140 000 Btu/h (41 kW) water heater is 7000 cubic feet (198.22 m$^3$).

Conclusion: The indoor volume is insufficient to supply combustion air since the total of 3600 cubic feet (101.94 m$^3$) does not meet the required volume of 7000 cubic feet (198.22 m$^3$). Therefore, additional combustion air shall be provided from the outdoors.

(3) Determine ratio of the available volume to the required volume:

$$\frac{3600 \text{ cubic feet}}{7000 \text{ cubic feet}} = 0.51$$
(4) Determine the reduction factor to be used to reduce the full outdoor air opening size to the minimum required based on the ratio of indoor spaces:

\[ 1.00 - 0.51 \text{ (from Step 3)} = 0.49 \]

(5) Determine the single outdoor combustion air opening size as though all combustion air is to come from outdoors. In this example, the combustion air opening directly communicates with the outdoors:

\[
\frac{140\,000 \text{ Btu/h}}{3000 \text{ British thermal units per square inch (Btu/in}^2)} = 47 \text{ square inches (0.03 m}^2)\]

(6) Determine the minimum outdoor combustion air opening area:

\[
\text{Outdoor opening area} = 0.49 \text{ (from Step 4)} \times 47 \text{ square inches (0.03 m}^2) = 23 \text{ square inches (0.01 m}^2)\]

Section 506.5.3(3) requires the minimum dimension of the air opening should not be less than 3 inches (76 mm). [NFPA 54:1.1]

**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).
Proposals

Item #: 284
UPC 2024 Section: K 101.2

SUBMITTER: Karan Kapila
Self

RECOMMENDATION:
Revise text

K 101.0 General.

K 101.2 System Design. Potable rainwater catchment systems in accordance with this appendix shall be designed by a registered design professional or person deemed competent by the Authority Having Jurisdiction to perform potable rainwater catchment system design work. Where required, rainwater catchment systems shall be seismically restrained against earthquakes in accordance with the building code.

SUBSTANTIATION:
Rainwater catchment systems are currently silent with regards to seismic provisions. It is imperative to protect the potable water that has been captured and the system. The addition of seismic restraints (where required) will guide the end user and designer to implement these safety features.
Proposals

Item #: 285
UPC 2024  Section: K 103.2.1

SUBMITTER: Karan Kapila  
Self

RECOMMENDATION:
Add new text

K 103.0 Potable Rainfall Catchment System Materials.

K 103.2 Rainwater Catchment System Drainage Materials. Materials used in rainwater catchment drainage systems, including gutters, downspouts, conductors, and leaders shall be in accordance with the requirements of this code for storm drainage.

K 103.2.1 Material for Potable Water Applications. Rainwater catchment system materials and components intended for potable water applications shall comply with NSF/ANSI 61 and shall be not more than a weighted average of 0.25 percent with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures in accordance with NSF/ANSI 372. For solder and flux, the lead content shall be not more than 0.2 percent where used in piping systems that convey or dispense water for human consumption.

Exceptions:
(1) Gutters, downspouts, conductors, and leaders shall not be required to comply with the requirements of Section K 103.2.1.
(2) Pipes, pipe fittings, plumbing fittings, fixtures, or backflow preventers used for nonpotable services or any other uses where the water is not used for human consumption.
(3) Flush valves, fill valves, flushometer valves, tub fillers, shower valves, service saddles, or water distribution main gate valves that are 2 inches (50 mm) in diameter or larger.

SUBSTANTIATION:
The proposed provisions are being included as minimum health and safety provisions concerning potable water. This makes it clear and upfront regarding what components of the rainwater catchment systems are required to meet the minimum potable water standards and lead contents allowed in the plumbing code.
Proposals

Item #: 286
UPC 2024  Section: K 105.3.1

SUBMITTER: Karan Kapila
Self

RECOMMENDATION:
Revise text

K 105.0 Rainwater Storage Tanks.

K 105.3 Location. (remaining text unchanged)
K 105.3.1 Above Grade. Above grade, storage tanks shall be of an opaque material, approved for aboveground use in direct sunlight, or shall be shielded from direct sunlight. Tanks shall be installed in an accessible location to allow for inspection and cleaning. The tank shall be installed on a foundation or platform that is constructed to accommodate the weight and loads when filled to capacity in accordance with the building code.

SUBSTANTIATION:
The proposed text adds clarity that foundations and supports for rainwater storage tanks should be designed to the maximum weights and loads of a tank that is filled to capacity. This may be intuitive; however, it may not be addressed elsewhere and this will ensure these loads and weights are taken into account.
APPENDIX L
SUSTAINABLE PRACTICES

L 404.0 Non-Sewered Sanitation Systems.
L 404.1 General. Non-sewered sanitation systems shall comply with ISO 30500.
L 404.2 Installation. The installation of non-sewered sanitation systems shall be in accordance with the manufacturer’s installation instructions and Section 404.2.1 through Section 404.2.5.
L 404.2.1 Operating Conditions. A non-sewered sanitation system in either a conditioned or unconditioned space shall be installed where the ambient temperature, ambient humidity, and altitude (atmospheric pressure) are in accordance with the manufacturer’s installation instructions or product listing.
L 404.2.2 Clearances for Servicing and Maintenance. A non-sewered sanitation system shall be located to permit access and sufficient clearance for service and maintenance. Unless otherwise specified by the manufacturer's installation instructions, not less than 30 inches in depth, width, and height of working space shall be provided at any access panel.
L 404.2.3 Backflow Prevention. A domestic water supply connection to a non-sewered sanitation system shall be protected in accordance with the plumbing code.
L 404.2.4 Effluent Storage. Any container or vessel for the storage of effluent discharged from a non-sewered sanitation system and not integral to such system shall be installed in accordance with the plumbing code.
L 404.2.5 Systems Employing Combustion. A non-sewered sanitation system employing combustion shall comply with the mechanical code.

Exception: A non-sewered sanitation system listed for unvented use.

L 404.3 Operation and Maintenance Manual. Non-sewered sanitation systems shall have an operation and maintenance manual provided by the manufacturer.
L 404.4 System Output. The use or disposal of all substances exiting the non-sewered sanitation system shall be determined by the Authority Having Jurisdiction.

(renumber remaining sections)

L 201.0 Definitions
Non-Sewered Sanitation System. A prefabricated integrated sewage treatment unit that is not connected to a public sewer or private sewage disposal system.

TABLE 1701.2
STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES

<table>
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<th>APPLICATION</th>
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This proposal covers the essential considerations that a building official must assess when a nonsewered sanitation system (as defined) is installed in a building. To facilitate commercialization of hi-tech toilets and their acceptance by national regulatory bodies, an ISO standard was adopted in 2018 to establish the key performance attributes of non-sewered sanitation systems (NSSSs). Standard 30500, "Non-sewered sanitation systems - Prefabricated integrated treatment units - General safety and performance requirements for design and testing," sets performance requirements for solid and liquid outputs, odor, noise, air emissions, materials, safety, marking, and ergonomics, together with relevant test procedures for measuring the attainment of these requirements. Designed for operation without a sewer connection and, in many cases, without a dedicated water supply, NSSSs are anticipated to meet critical public health needs in developing countries with limited water and wastewater infrastructure. However, this new standard carries important implications for water and wastewater management and utility service in North America as well. From national parks to suburban shopping malls to net zero homes, high-tech toilets meeting the new ISO standard could find uses that upend our approach to sanitation and our expectations about future water demands and the placement and capacity of water-related infrastructure. In 2011, the Bill & Melinda Gates Foundation launched the "Reinvent the Toilet Challenge" to bring new technology to bear to achieve "sustainable sanitation solutions." The target is a device that provides complete and effective treatment of human sanitary waste, unconnected to any sewer or drainage network and with minimal inputs of water and energy. Eight teams have received foundation support to develop prototypes for lab testing, field trials, and eventual commercialization. Among these early devices, three broad pathways for treatment technology have been applied - electro-chemical, biological, and combustion - and in some cases, combinations of these in the same device. The provisions in this proposal address the considerations that must be taken into account by building officials regarding the placement and installation of NSSSs in buildings. The proposal would permit (but not require) the installation of a NSSS listed to the ISO standard, providing an exception to the general requirement that sanitation devices be connected to the building drainage system. Criteria for the functioning of the unit for its intended purpose are established by the ISO standard, and do not need to be repeated in code language in the UPC. Certain key protections, such as backflow prevention, proper ventilation of combustion-based units, and proper siting of any storage tanks external to the unit are each specified in the proposal. The clearance requirements in Section L 404.2.2 correspond with the basic requirements found in the Uniform Mechanical Code, Section 304.1. Considerations of the use and disposal of outputs of the system are specifically referred to an AHJ, which would most likely be a health department. With reinvented toilets now on the cusp of commercialization, the widespread use of toilets without water and sewer connections carries profound implications for US utilities and builders. While much is still unknown about their cost, maintenance, reliability, and even the business model for their installation and service, forward-looking communities will want to be prepared to ensure the safe installation and use of this promising new technology, which will soon be available. This proposal lays the necessary groundwork for code officials to inspect and approve their installation.
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>0</sub> by the appropriate plant factor or coefficient.

ET<sub>0</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 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) 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 404.7.1 Pulpers and Mechanical Strainers.** The water use for pulpers or mechanical strainers shall not exceed 3.2 gpm (14.4 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 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 L 407.1
DEDICATED WATER METERING REQUIREMENTS

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cooling Towers</strong></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><strong>Evaporative Coolers</strong></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</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</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 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><strong>Landscape Irrigation</strong></td>
<td>Landscape irrigation water where either of the following conditions exist:</td>
</tr>
<tr>
<td>(1) Total accumulated landscape area with in-ground irrigation system exceeds 2500 square feet (232 m²). or</td>
<td></td>
</tr>
<tr>
<td>(2) Total accumulated landscape area using an automatic irrigation controller exceeds 1500 square feet (139 m²)</td>
<td></td>
</tr>
<tr>
<td><strong>Onsite Water Collection Systems</strong></td>
<td>Where the water purveyor provides a separate water supply meter that serves only the irrigation system, an additional dedicated meter is not required.</td>
</tr>
<tr>
<td><strong>Ornamental Water Features</strong></td>
<td>Polable or reclaimed water supplies for ornamental water features where the water feature uses an automatic refill valve.</td>
</tr>
<tr>
<td><strong>Pools and Spas</strong></td>
<td>A makeup water supply to a swimming pool or spa.</td>
</tr>
<tr>
<td><strong>Roof Spray Systems</strong></td>
<td>Roof spray systems for irrigating vegetated roofs or thermal conditioning covering an area greater than 300 square feet (28 m²).</td>
</tr>
<tr>
<td><strong>Tenant Buildings - Common Areas</strong></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><strong>Tenant Spaces - Residential</strong></td>
<td>All water supplies to each residential tenant space for indoor water use.</td>
</tr>
<tr>
<td><strong>Tenant Spaces - Non-residential, car washes</strong></td>
<td>All water supplies to individual non-residential tenant spaces for indoor water use where any of the following conditions exist:</td>
</tr>
<tr>
<td>(1) The nominal size of a water supply pipe(s) to the individual tenant space is greater than ½ inch. or</td>
<td></td>
</tr>
<tr>
<td>(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>
<td></td>
</tr>
<tr>
<td><strong>Exception:</strong> 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.</td>
<td></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 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.
(2) Utilize on-site 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 when adequate soil moisture is present for plant growth.
(4) Have the capability to program multiple and different run times for each irrigation zone to enable cycling of water applications and durations to mitigate water flowing off of the intended irrigation zone.
(5) Be capable of indicating to the user when it is not receiving a signal or local sensor input.
(6) Be capable of allowing for a manual operation troubleshooting test cycle and shall automatically return to sensor input mode within some period of time as designated by the manufacturer, even when the switch is still positioned for...
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 411.6 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 5% 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 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 411.14 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 pipes 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 shut off 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. 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 shut off 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 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 L 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>
</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>NA</td>
<td>0.68</td>
<td>0.85</td>
</tr>
<tr>
<td>½</td>
<td>1.69</td>
<td>1.55</td>
<td>1.45</td>
</tr>
<tr>
<td>¾</td>
<td>3.43</td>
<td>3.22</td>
<td>3.01</td>
</tr>
<tr>
<td>1</td>
<td>5.81</td>
<td>5.49</td>
<td>5.17</td>
</tr>
<tr>
<td>11/4</td>
<td>8.70</td>
<td>8.36</td>
<td>8.09</td>
</tr>
<tr>
<td>2</td>
<td>21.08</td>
<td>20.58</td>
<td>20.04</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>
</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>
<td>37.8</td>
<td>56.7</td>
</tr>
<tr>
<td>1/2</td>
<td>14.2</td>
<td>23.7</td>
<td>35.5</td>
</tr>
<tr>
<td>3/4</td>
<td>7.0</td>
<td>11.6</td>
<td>17.5</td>
</tr>
<tr>
<td>1</td>
<td>4.1</td>
<td>6.9</td>
<td>10.3</td>
</tr>
<tr>
<td>11/4</td>
<td>2.8</td>
<td>4.6</td>
<td>6.9</td>
</tr>
<tr>
<td>11/2</td>
<td>2.0</td>
<td>3.3</td>
<td>4.9</td>
</tr>
<tr>
<td>2</td>
<td>1.1</td>
<td>1.9</td>
<td>2.8</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></td>
<td>24 OZ</td>
<td>40 OZ</td>
<td>60 OZ</td>
<td>24 OZ</td>
</tr>
<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>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)</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 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</th>
<th>NOMINAL PIPE SIZE OR TUBE SIZE THICKNESS (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CONDUCTIVITY Btu•inch/(h•ft²•°F)</td>
<td>MEAN RATING TEMPERATURE (°F)</td>
</tr>
<tr>
<td>&gt;350</td>
<td>0.32 to 0.34</td>
<td>250</td>
</tr>
<tr>
<td>251 to 350</td>
<td>0.29 to 0.32</td>
<td>200</td>
</tr>
<tr>
<td>201 to 250</td>
<td>0.27 to 0.30</td>
<td>150</td>
</tr>
<tr>
<td>141 to 200</td>
<td>0.25 to 0.29</td>
<td>125</td>
</tr>
<tr>
<td>105 to 140</td>
<td>0.22 to 0.28</td>
<td>100</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:
   \[ T = r \left( 1 + t/r \right) K/k - 1 \]
   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•in/(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.

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(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 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 60 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) (remaining text unchanged)

(5) Pool pumps and replacement pool pump motors shall meet requirements of APSP-15.

**TABLE 1701.2**

<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 updates correlate with the latest edition of the WeStand.
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 through Section L 503.3.2, and Section 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 503.2.1 Energy Cost Budget Method. Projects using the energy cost budget method of ASHRAE 90.1 for demonstrating compliance with the standard shall be in accordance with the requirements of Section L 503.3 in conjunction with the energy cost budget method of ASHRAE 90.1.

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]

### 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 REQUIRED¹</th>
<th>TEST PROCEDURE²,³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric tabletop water heaters</td>
<td>&lt;=12 kW</td>
<td>Resistance &gt;=4000 (Btu/h)/gal and &lt;=20 gal and &lt;=120 gal</td>
<td>See footnote 7 For applications outside U.S., see footnote (h). For U.S. applications, see footnote (7).</td>
<td>— Appendix E of 10 CFR 430</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric water heaters</td>
<td>&lt;=12 kW5</td>
<td>Resistance &gt;=20 gal</td>
<td>See footnote 7</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>&gt;12 kW5</td>
<td>Resistance &gt;=20 gal</td>
<td>0.3 + 27vVm percent/h</td>
<td>Section G.2 of CSA Z21.10.3</td>
</tr>
<tr>
<td></td>
<td>&lt;=24 Amps and &lt;=250 Volts</td>
<td>Heat Pump</td>
<td>See footnote 7</td>
<td>—</td>
</tr>
<tr>
<td>Electric storage water heaters</td>
<td>&lt;=12 kW</td>
<td>&lt;4000 (Btu/h)/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></td>
<td></td>
<td>&gt;=20 gal and &lt;=55 gal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;4000 (Btu/h)/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></td>
<td></td>
<td>&gt;=55 gal and &lt;=120 gal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;12 kW6</td>
<td>&lt;4000 (Btu/h)/gal</td>
<td>SL &lt;= 0.3 + 27vVm %/h</td>
<td>10 CFR 431.106</td>
</tr>
<tr>
<td>Electric instantaneous water heaters</td>
<td>&lt;=12 kW</td>
<td>&gt;=4000 (Btu/h)/gal</td>
<td>For applications outside U.S., see footnote (8). For US applications, see footnote (7).</td>
<td>Appendix E of 10 CFR 430</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;=2 gal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;12 kW and &lt;=58.6 kW5</td>
<td>&gt;=4000 (Btu/h)/gal</td>
<td>Very Small DP: UEF = 0.80 Low DP: UEF = 0.80</td>
<td>Appendix E of 10 CFR 430</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;=2 gal and &lt;=180°F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Gas Storage Water Heaters

<table>
<thead>
<tr>
<th>Power Range</th>
<th>Temperature</th>
<th>Emission Limit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 58.6 kW</td>
<td>&lt;= 75,000 Btu/h</td>
<td>&lt;= 10 gal</td>
<td>No requirement</td>
</tr>
<tr>
<td>&gt;= 4000 (Btu/h)/gal</td>
<td>&lt;= 55 gal</td>
<td>See footnote 7</td>
<td></td>
</tr>
<tr>
<td>&gt;= 4000 (Btu/h)/gal</td>
<td>&gt; 10 gal</td>
<td>See footnote 7</td>
<td></td>
</tr>
</tbody>
</table>

### Gas Instantaneous Water Heaters

<table>
<thead>
<tr>
<th>Power Range</th>
<th>Temperature</th>
<th>Emission Limit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 75,000 Btu/h and &lt;= 105,000 Btu/h</td>
<td>&lt;= 120 gal</td>
<td>80% Et SL &lt;= (Q/800 + 110V) SL, Btu/h</td>
<td>See Sections G.1 and G.2 of CSA Z21.10.3 and 10 CFR 431.106</td>
</tr>
<tr>
<td>&gt; 75,000 Btu/h and &lt;= 105,000 Btu/h</td>
<td>&lt;= 180°F</td>
<td>80% Et</td>
<td>See Sections G.1 and G.2 of CSA Z21.10.3 and 10 CFR 431.106</td>
</tr>
</tbody>
</table>

### Oil Storage Water Heaters

<table>
<thead>
<tr>
<th>Power Range</th>
<th>Temperature</th>
<th>Emission Limit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 105,000 Btu/h</td>
<td>&lt;= 4000 (Btu/h)/gal</td>
<td>0.69 - 0.0006V × EF</td>
<td>See Sections G.1 and G.2 of CSA Z21.10.3 and 10 CFR 431.106</td>
</tr>
<tr>
<td>&gt; 105,000 Btu/h and &lt;= 140,000 Btu/h</td>
<td>&lt;= 120 gal</td>
<td>80% Et SL &lt;= (Q/800 + 110V) SL, Btu/h</td>
<td>See Sections G.1 and G.2 of CSA Z21.10.3 and 10 CFR 431.106</td>
</tr>
<tr>
<td>&gt; 140,000 Btu/h</td>
<td>&lt; 4000 (Btu/h)/gal</td>
<td>80% Et</td>
<td>See Sections G.1 and G.2 of CSA Z21.10.3 and 10 CFR 431.106</td>
</tr>
</tbody>
</table>

### Oil Instantaneous Water Heaters

<table>
<thead>
<tr>
<th>Power Range</th>
<th>Temperature</th>
<th>Emission Limit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 210,000 Btu/h</td>
<td>&gt;= 4000 (Btu/h)/gal</td>
<td>See footnote 7</td>
<td>See Appendix E of 10 CFR 430 as it appeared as of 1/1/2014</td>
</tr>
<tr>
<td>&gt;= 20 gal and &lt;= 55 gal</td>
<td>&lt;= 100 gal</td>
<td>See footnote 7</td>
<td>See Appendix E of 10 CFR 430 as it appeared as of 1/1/2014</td>
</tr>
<tr>
<td>&gt;= 55 gal and &lt;= 100 gal</td>
<td>&lt;= 180°F</td>
<td>80% Et EF</td>
<td>See Appendix E of 10 CFR 430 as it appeared as of 1/1/2014</td>
</tr>
</tbody>
</table>

### Equations

- Medium DP: $\text{UEF} = 0.6002 - (0.0011 \times V_r)$
- High DP: $\text{UEF} = 0.6597 - (0.0009 \times V_r)$
- Very Small DP: $\text{UEF} = 0.2674 - (0.0009 \times V_r)$
- Low DP: $\text{UEF} = 0.5362 - (0.0012 \times V_r)$
- $V_r$ is the volume rate of flow in gals per minute.
<table>
<thead>
<tr>
<th>Thermal Efficiency (Et)</th>
<th>Standby Loss (SL)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;210 000 Btu/h</td>
<td>&gt;=4000 (Btu/h)/gal and &lt;10 gal</td>
<td>80% Et</td>
</tr>
<tr>
<td></td>
<td>&gt;=4000 (Btu/h)/gal and &gt;=10 gal</td>
<td>78% Et</td>
</tr>
<tr>
<td>&gt;210 000 Btu/h</td>
<td>&gt;=4000 (Btu/h)/gal and &gt;=10 gal</td>
<td>SL &lt;= (Q/800 + 110vV) SL, Btu/h</td>
</tr>
</tbody>
</table>

**Hot-water supply boilers, gas and oil**
- >300 000 Btu/h and <12 500 000 Btu/h
- >4000 (Btu/h)/gal and <10 gal
- 80% Et

**Hot-water supply boilers, gas**
- >300 000 Btu/h and <12 500 000 Btu/h
- >4000 (Btu/h)/gal and >=10 gal
- 80% Et

**Hot-water supply boilers, oil**
- >300 000 Btu/h and <12 500 000 Btu/h
- >4000 (Btu/h)/gal and >=10 gal
- 78% Et

**Pool heaters, oil and gas**
- All
- —
- See footnote 7
- 82% Et for commercial pool heaters and for applications outside U.S. For U.S. applications, see footnote (7).

**Heat pump pool heaters**
- All
- 50°F db 44.2°F wb
- Outdoor air 80.0°F entering water
- 4.0 COP

**Unfired storage tanks**
- All
- —
- R-12.5

**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). Vm is the measured volume in the tank in gallons. Standby loss for electric water heaters is in terms of %/h and denoted by the term “S,” and standby loss for gas and oil water heaters is in terms of Btu/h 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, Vr refers to the rated volume in gallons.
2. ASHRAE 90.1 contains a complete specification, including the year version, of the referenced test procedure.
4. 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°C) or higher;
   (c) uses three-phase power.

5. 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°C) or higher;
   (c) uses three-phase power.

6. 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>
<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>
<tr>
<td></td>
<td>Efficiency of Commercial Water Heating Equipment</td>
<td></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).
Proposals

Item #: 290
UPC 2024  Section: L 201.0

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

RECOMMENDATION:
Revise text

L 201.0 Definitions.

**Water Factor (WF).** A measurement and rating of appliance water efficiency, most often used for residential and light commercial clothes washers, as follows:

**Water Factor (WF), Clothes Washer.** The quantity of water in gallons used to complete a full wash and rinse cycle per measured cubic foot capacity of the clothes washer container.

**Integrated Water Factor (IWF).** The quotient of the total weighted per-cycle water consumption for all wash cycles in gallons divided by the cubic foot (or liter) capacity of the clothes washer.

SUBSTANTIATION:
Replace definitions of Water Factor (WF) and Water Factor, Clothes Washer. These terms have been superseded and are out of date. Suggest including definition for Integrated Water Factor, as defined by ENERGY STAR

Proposals

Item #: 291

UPC 2024  Section: Table L 402.1

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

RECOMMENDATION:
Revise text

### TABLE L 402.1
**MAXIMUM FIXTURE AND FIXTURE FITTINGS FLOW RATES**

<table>
<thead>
<tr>
<th>FIXTURE TYPE</th>
<th>FLOW RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Showerheads</td>
<td>2.0 gpm at 80 psi</td>
</tr>
<tr>
<td>Kitchen faucets residential⁴</td>
<td>1.8 gpm at 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets residential</td>
<td>1.5 gpm at 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets other than residential</td>
<td>0.5 gpm at 60 psi</td>
</tr>
<tr>
<td>Metering faucets</td>
<td>0.25 gallons/cycle</td>
</tr>
<tr>
<td>Metering faucets for wash fountains</td>
<td>One 0.25 gallons/cycle fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Wash fountains</td>
<td>One 2.2 gpm at 60 psi fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Water Closets</td>
<td>1.28 gallons/flush²</td>
</tr>
<tr>
<td>Urinals</td>
<td>0.5 gallons/flush³</td>
</tr>
<tr>
<td>Commercial Pre-Rinse Spray Valves</td>
<td>1.3 gpm at 60 psi  See Section L 402.8</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 inch = 25.4 mm, 1 gallon = 3.785 L

**Notes:**
1. For multiple showerheads serving one shower compartment see Section L 402.6.1.
2. Shall be listed to EPA WaterSense Tank-Type Toilet Specification.
3. Shall be listed to EPA WaterSense Flushing Urinal Specification. Non-water urinals shall comply with specifications listed in Section L 402.3.1.
4. See Section L 402.4.

**SUBSTANTIATION:**
Commercial pre-rinse spray valves are no longer regulated at clear flow rate maximum, and instead are regulated based on spray force. See later comment on Section L 402.8.
Proposals

Item #: 292
UPC 2024  Section: Table L 402.1, Table 1701.2

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

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>TABLE L 402.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXIMUM Fixture AND Fixture fittings FLOW RATES</td>
</tr>
<tr>
<td>FIXTURE TYPE</td>
</tr>
<tr>
<td>Showerheads</td>
</tr>
<tr>
<td>Kitchen faucets residential⁴</td>
</tr>
<tr>
<td>Lavatory faucets residential</td>
</tr>
<tr>
<td>Lavatory faucets other than residential</td>
</tr>
<tr>
<td>Metering faucets</td>
</tr>
<tr>
<td>Metering faucets for wash fountains</td>
</tr>
<tr>
<td>Wash fountains</td>
</tr>
<tr>
<td>Water Closets</td>
</tr>
<tr>
<td>Urinals</td>
</tr>
<tr>
<td>Commercial Pre-Rinse Spray Valves</td>
</tr>
</tbody>
</table>

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

Notes:
1. Shall be listed to EPA WaterSense Specification for Showerheads. For multiple showerheads serving one shower compartment see Section L 402.6.1.
2. Shall be listed to EPA WaterSense Tank-Type Toilet Specification.
3. Shall be listed to EPA WaterSense Flushing Urinal Specification. Non-water urinals shall comply with specifications listed in Section L 402.3.1.
4. See Section L 402.4.

<table>
<thead>
<tr>
<th>TABLE 1701.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>STANDARDS, PUBLICATIONS, PRACTICES, AND GUIDES</td>
</tr>
<tr>
<td>DOCUMENT NUMBER</td>
</tr>
<tr>
<td>EPA WaterSense-2018</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
Revised note is consistent with other references to WaterSense specifications within Table L402.1 notes.
Proposals

Item #: 293

UPC 2024   Section: Table L 402.1, Table 1701.2

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

RECOMMENDATION:
Revise text

<table>
<thead>
<tr>
<th>TABLE L 402.1</th>
<th>MAXIMUM FIXTURE AND FIXTURE FITTINGS FLOW RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIXTURE TYPE</td>
<td>FLOW RATE</td>
</tr>
<tr>
<td>Showerheads</td>
<td>2.0 gpm at 80 psi</td>
</tr>
<tr>
<td>Kitchen faucets residential</td>
<td>1.8 gpm at 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets residential</td>
<td>1.5 gpm at 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets other than residential</td>
<td>0.5 gpm at 60 psi</td>
</tr>
<tr>
<td>Metering faucets</td>
<td>0.25 gallons/cycle</td>
</tr>
<tr>
<td>Metering faucets for wash fountains</td>
<td>One 0.25 gallons/cycle fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Wash fountains</td>
<td>One 2.2 gpm at 60 psi fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Water Closets</td>
<td>1.28 gallons/flush</td>
</tr>
<tr>
<td>Urinals</td>
<td>0.5 gallons/flush</td>
</tr>
<tr>
<td>Commercial Pre-Rinse Spray Valves</td>
<td>1.3 gpm at 60</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 inch = 25.4 mm, 1 gallon = 3.785 L

Notes:
1 For multiple showerheads serving one shower compartment see Section L 402.6.1.
2 Shall be listed to EPA WaterSense Specification for Tank-Type Toilet or Specification for Flushometer-Valve Water Closets.
3 Shall be listed to EPA WaterSense Flushing Urinal Specification. Non-water urinals shall comply with specifications listed in Section L 402.3.1.
4 See Section L 402.4.

<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 WaterSense-2015</td>
<td>Specification for Flushometer-Valve Water Closets</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
EPA WaterSense has developed separate specifications that differentiate between tank-type toilets (i.e., gravity, pressure assist, or electro-hydraulic tank-type water closets) and flushometer-valve water closets. Both specifications are currently referenced in Section L402.2, so notes should be consistent.
Item #: 294

UPC 2024  Section: Table L 402.1

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

RECOMMENDATION:
Revise text

### TABLE L 402.1
MAXIMUM FIXTURE AND FIXTURE FITTINGS FLOW RATES

<table>
<thead>
<tr>
<th>FIXTURE TYPE</th>
<th>FLOW RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Showerheads</td>
<td>2.0 gpm at 80 psi&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Kitchen faucets residential&lt;sup&gt;4&lt;/sup&gt;</td>
<td>1.8 gpm at 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets residential&lt;sup&gt;5&lt;/sup&gt;</td>
<td>1.5 gpm at 60 psi</td>
</tr>
<tr>
<td>Lavatory faucets other than residential</td>
<td>0.5 gpm at 60 psi</td>
</tr>
<tr>
<td>Metering faucets</td>
<td>0.25 gallons/cycle</td>
</tr>
<tr>
<td>Metering faucets for wash fountains</td>
<td>One 0.25 gallons/cycle fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Wash fountains</td>
<td>One 2.2 gpm at 60 psi fixture fitting for each 20 inches rim space</td>
</tr>
<tr>
<td>Water Closets</td>
<td>1.28 gallons/flush&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Urinals</td>
<td>0.5 gallons/flush&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>Commercial Pre-Rinse Spray Valves</td>
<td>1.3 gpm at 60</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 inch = 25.4 mm, 1 gallon = 3.785 L

Notes:
1 For multiple showerheads serving one shower compartment see Section L 402.6.1.
2 Shall be listed to EPA WaterSense Tank-Type Toilet Specification.
3 Shall be listed to EPA WaterSense Flushing Urinal Specification. Non-water urinals shall comply with specifications listed in Section L 402.3.1.
4 See Section L 402.4.
5 Shall be listed to EPA WaterSense High-Efficiency Lavatory Faucet Specification.

SUBSTANTIATION:
Consistent with other references to WaterSense specifications within Table 402.1 notes. WaterSense Specification is already referenced in Section L 402.5.1.
Proposals

Item #: 295

UPC 2024  Section: L 402.8, Table L 402.8

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

RECOMMENDATION:
Revise text

L 402.0 Water-Conserving Plumbing Fixtures and Fittings.

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) the maximum flow rate, as specified in Table L 402.8. 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 integral automatic shutoff. Pre-rinse spray valves shall be listed to the EPA WaterSense Commercial Pre-Rinse Spray Valve Specification.

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

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

SUBSTANTIATION:
Effective as of January 2019, the Department of Energy has new maximum flow rate requirements for pre-rinse spray valves depending on the spray force. Suggest revising flow rate requirements within UPC to be consistent.

In response, WaterSense sunset its specification and no longer labels this product category. See https://www.epa.gov/watersense/pre-rinse-spray-valves for more information.
Proposals

Item #: 296
UPC 2024 Section: L 402.8

SUBMITTER: Tim Collings
self

RECOMMENDATION:
Add new text

L 402.0 Water-Conserving Plumbing Fixtures and Fittings.

L 402.8 Bath and Shower Flow-Reduction Devices. Bath and shower flow-reduction devices shall comply with IAPMO IGC 244.

(renumber remaining sections)

SUBSTANTIATION:
Tub and shower flow-reduction devices are intended for reducing the waste of water and energy by the use of a valve or system of valves that reduces the flow of water to a trickle once a set temperature is reached. This standard covers temperature-actuated flow-reduction devices and systems intended to be installed in tub spouts or immediately upstream of shower heads and specifies requirements for materials, physical characteristics, performance testing, and markings.
Proposals

Item #: 297
UPC 2024  Section: L 404.8

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

RECOMMENDATION:
Revise text

L 404.0 Occupancy Specific Water Efficiency Requirements.

L 404.8 Medical and Laboratory Facilities. Medical and laboratory facilities shall comply with the water efficiency requirements in Section L 404.9 through Section L 404.11 L 404.12.

SUBSTANTIATION:
In later comment, suggest adding new section (L 404.12) to address vacuum systems within medical and laboratory facilities. If accepted, section reference should be updated in Section L 404.8.
Proposals

Item #: 298

UPC 2024 Section: L 404.12

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

RECOMMENDATION:
Add new text

L 404.0 Occupancy Specific Water Efficiency Requirements.

L 404.12 Vacuum Systems. Dry vacuum systems that do not use water to form a seal for a vacuum pump or use flowing water to create a vacuum shall be used.

SUBSTANTIATION:
Wet vacuum pumps can be large water users within medical and laboratory settings. Suggest specifying that dry vacuum systems should be used in these facility types, as this is the "sustainable" option (purpose of Appendix L). Dry vacuums are also becoming more and more prevalent.
Proposals

Item #: 299
UPC 2024  Section: L 409.1

SUBMITTER: Tim Collings

RECOMMENDATION:
Revise text

L 409.0 Water-Powered Sump Pumps.

L 409.1 General. Sump pumps powered by potable or reclaimed (recycled) water pressure shall be used as an emergency backup pump and shall comply with IAPMO PS 119. The water-powered pump shall be equipped with a battery powered alarm having a minimum rating of 85 dBA at 10 feet (3048 mm). Water-powered pumps shall have a water efficiency factor of pumping at least 1.4 gallons (5.3 L) of water to a height of 10 feet (3048 mm) for every gallon of water used to operate the pump, measured at a water pressure of 60 psi (414 kPa). Pumps shall be labeled as to the gallons of water pumped per gallon of potable water consumed.

Water-powered stormwater sump pumps shall be equipped with a reduced pressure principle backflow prevention assembly.

SUBSTANTIATION:
Water powered emergency backup sump pumps are commonly used in the industry. This standard covers water-powered sump pumps intended to provide emergency or backup groundwater or storm water removal from buildings in the event of power failure and specifies requirements for materials, physical characteristics, performance testing, and markings. Once water rises past the normal high-water level in your pit, the water powered pump’s float lifts, causing it to take over the pumping duties and prevent water from overflowing out of your sump pit. The addition of the standard is required to ensure that these emergency pumps meet the minimum safety and performance requirements.
Proposals

Item #: 300
UPC 2024  Section: L 410.3, Table 1701.2

SUBMITTER: Jason M Shank
ASSE International

RECOMMENDATION:
Revise text

L 410.0 Water Softeners and Treatment Devices.

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 and ASSE 1086.

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>ASSE 1086-2020</td>
<td>Reverse Osmosis Water Efficiency – Drinking Water</td>
<td>Appliances</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

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

Item #: 301

UPC 2024  Section: L 411.4, Table 1701.2

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

RECOMMENDATION:
Revise text

L 411.0 Landscape Irrigation Systems.

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) - (5) (remain unchanged)

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA WaterSense-2011</td>
<td>Specification for Weather-Based Irrigation Controllers</td>
<td>Irrigation</td>
</tr>
<tr>
<td>EPA WaterSense-2021</td>
<td>Specification for Soil Moisture-Based Irrigation Controllers</td>
<td>Irrigation</td>
</tr>
</tbody>
</table>

(subtlety to the EPA WaterSense Specification for Weather-Based and Soil Moisture-Based Irrigation Controllers)

SUBSTANTIATION:
EPA WaterSense has developed a specification for weather-based irrigation controllers and a specification for soil moisture-based irrigation controllers. More information can be found here: https://www.epa.gov/watersense/irrigation-controllers. These specifications ensure performance (and efficiency) of irrigation controllers that use weather and soil data, are developed in collaboration with industry and other stakeholders.
Proposals

Item #: 302

UPC 2024  Section: L 411.10.2, Table 1701.2

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

RECOMMENDATION:
Revise text

L 411.0 Landscape Irrigation Systems.

L 411.10 Sprinkler Head Installations. (remaining text unchanged)

L 411.10.2 Sprinkler Head Pressure Regulation. Sprinkler heads shall utilize pressure regulation devices (as part of an irrigation system or integral to the sprinkler body) to maintain manufacturer’s recommended operating pressure for each sprinkler and nozzle type. Spray sprinkler bodies with integral pressure regulation shall be listed to the EPA WaterSense Specification for Spray Sprinkler Bodies.

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA WaterSense-2017</td>
<td>Specification for Spray Sprinkler Bodies</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
EPA WaterSense has developed a specification for spray sprinkler bodies, that ensures they have integral pressure regulation. More information can be found here: https://www.epa.gov/watersense/spray-sprinkler-bodies
Proposals

Item #: 303
UPC 2024 Section: L 501.4.1

SUBMITTER: Tim Collings
Self

RECOMMENDATION:
Add new text

L 501.0 Water Heating Design, Equipment, and Installation.

L 501.4 Recirculation Pump Controls. Pump controls shall include on-demand activation or time clocks combined with temperature sensing. Time clock controls for pumps shall not let the pump operate more than 15 minutes every hour. Temperature sensors shall stop circulation where the temperature set point is reached and shall be located on the circulation loop at or near the last fixture. The pump, pump controls, and temperature sensors shall be accessible. Pump operation shall be limited to the building’s hours of operation.

L 501.4.1 Hot Water On-Demand Pumping Systems. Hot water on-demand pumping systems manually actuated or automatically activated hot water pumping systems shall comply with IAPMO PS 115.

SUBSTANTIATION:
These pumping systems use a hot water return line to prime the hot water piping system upon activation. These pumping systems do not mix the hot or warm water with the cold water supply. These systems do not run continuously, they supply the hot water when activated.
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). 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 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
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.
N 102.2 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.
N 102.3 Disinfecting Hot Water. Water at a temperature not less than 160°F (71°C).
Hazard. See Risk.
Hygenation. 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.
N 102.4 Hot Water. Water at a temperature not less than 130°F (54°C) and less than 140°F (60°C).
N 102.5 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.
N 102.6 Scald Potential. The likelihood of burning the skin.
N 102.7 Tempered Hot Water. Water at a temperature not less than 120°F (49°C) and less than 130°F (54°C).
N 102.8 Tepid Cold Water. Water at a temperature not less than 77°F (25°C) and less than 85°F (29°C).
N 102.9 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 102.4 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 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 104.4 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 1-2</th>
<th>LEGIONELLA GROWTH POTENTIAL 2</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 Hyperthermia is possible after long exposure in a bathtub or whirlpool tub.</td>
<td>High</td>
</tr>
<tr>
<td>Warm</td>
<td>&gt;/=110 and &lt;120</td>
<td>Minimal At 111°F, greater than 220 minutes for second-degree burn.</td>
<td>Moderate</td>
</tr>
<tr>
<td>Tempered Hot</td>
<td>&gt;/=120 and &lt;130</td>
<td>Low 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>
<td>Low</td>
</tr>
<tr>
<td>Hot</td>
<td>&gt;/=130 and &lt;140</td>
<td>Moderate to High At 130°F, 18 seconds for second-degree burn, and 30 seconds for third-degree burn.</td>
<td>None</td>
</tr>
<tr>
<td>Very Hot</td>
<td>&gt;/=140 and &lt;160</td>
<td>High 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>
<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.

    - Copper and silver ionization concentrations shall be included in the documentation.
Methods and documentation for monitoring ion levels.

Electrode cleaning cycles and methods shall be reported.

N 105.1.2 Ultraviolet Light. Ultraviolet light methods shall include the following documentation:

- Locations of ultraviolet light units.
- 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
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 professional,³ 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 professional² 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 professional² 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:

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.
Proposals

Item #: 306

UPC 2024  Section: Appendix O, Table 1701.2

SUBMITTER: Edward R. Osann (Natural Resources Defense Council); C.J. Lagan (LIXIL Water Technology Americas); Albert Robert (Bob) Rubin (North Carolina State University)

RECOMMENDATION:
Add new text

Appendix O
Non-Sewered Sanitation Systems

O 101.0 General.
O 101.1 Applicability. The provisions of this chapter shall apply to the installation of non-sewered sanitation systems.

O 201.0 Definitions.
O 201.1 General. For purposes of this chapter, the following definitions shall apply.
Conditioned Space. An area, room, or space normally occupied and being heated or cooled for human habitation by any equipment.
Non-Sewered Sanitation System. A prefabricated integrated sewage treatment unit that is not connected to a public sewer or private sewage disposal system.

O 301.0 Installation.
O 301.1 General. The installation of non-sewered sanitation systems shall be in accordance with the manufacturer's installation instructions and with Section O 301.2 through Section O 301.7.
O 301.2 Operating Conditions. A non-sewered sanitation system in either a conditioned or unconditioned space shall be installed where the ambient temperature, ambient humidity, and altitude (atmospheric pressure) are in accordance with the manufacturer's installation instructions or product listing.
O 301.3 Clearances for Servicing and Maintenance. A non-sewered sanitation system shall be located to permit access and sufficient clearance for service and maintenance. Unless otherwise specified by the manufacturer's installation instructions, not less than 30 inches (762 mm) in depth, width, and height of working space shall be provided at any access panel.
O 301.4 Backflow Prevention. A domestic water supply connection to a non-sewered sanitation system shall be protected in accordance with this code.
O 301.5 Effluent Storage. Any container or vessel for the storage of effluent discharged from a non-sewered sanitation system and not integral to such system shall be installed in accordance with the plumbing code.
O 301.6 Systems Employing Combustion. A non-sewered sanitation system employing combustion shall comply with the mechanical code.
Exception: A non-sewered sanitation system listed for unvented use.
O 301.7 Connection to Plumbing System Not Required. Unless the Authority Having Jurisdiction determines otherwise, a non-sewered sanitation system is not required to be connected to the drainage system of the building or premises.

O 401.0 Manual Required.
O 401.1 Operation and Maintenance Manual. Non-sewered sanitation systems shall have an operation and maintenance manual provided by the manufacturer.

O 501.0 System Output. The use or disposal of all substances exiting the non-sewered sanitation system shall be determined by the Authority Having Jurisdiction.
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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</table>

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Note: ANSI/CAN/IAPMO/ISO 30500 meets the requirements for a mandatory reference standards in accordance with Section 3-3.7.1 of IAPMO’s Regulations Governing Committee Projects.

SUBSTANTIATION:
This proposal covers the essential considerations that a building official must assess when a non-sewered sanitation system (NSSS) as defined herein is installed in a building. Designed for operation without a sewer connection and, in many cases, without a dedicated water supply, NSSSs are anticipated to meet critical public health needs in areas with limited water and wastewater infrastructure, water supply constraints, and/or unfavorable soils for traditional on-site disposal methods. In the U.S., over 20% of the population relies on an onsite wastewater system. And even today, a portion of our population does not have access to fully functioning sanitation, largely due to lack of affordable infrastructure or to challenging site conditions.

To facilitate commercialization of hi-tech toilets and their acceptance by state and national regulatory bodies, an ISO standard was adopted in 2018 to establish the key performance attributes of NSSSs. Standard 30500, Non-sewered sanitation systems - Prefabricated integrated treatment units - General safety and performance requirements for design and testing, sets performance requirements for solid and liquid outputs, odor, noise, air emissions, materials, safety, marking, and ergonomics, together with relevant test procedures for measuring the attainment of these requirements. This ISO standard was adopted in identical form as a US and Canadian national standard in 2019, designated as ANSI/CAN/IAPMO/ISO 30500:2019.

In 2011, the Bill & Melinda Gates Foundation launched the "Reinvent the Toilet Challenge" to bring new technology to bear to achieve sustainable sanitation solutions. The target is a factory-built device that provides complete and effective treatment of human sanitary waste, unconnected to any sewer or drainage network and with minimal inputs of water and energy. Eight teams have received foundation support to develop prototypes for lab testing, field trials, and commercialization. Among these initial devices, three broad pathways for treatment technology have emerged - electro-chemical, biological, and combustion - and in some cases, combinations of these in the same device. Manufacturers have been involved in these efforts, and LIXIL (owner of American Standard) and other companies are working to develop compliant systems for both domestic and international installations. It is the general preference of manufacturers to design systems that are compliant with published codes and standards, rather than one-off compliance reviews by individual jurisdictions.

The provisions in this proposal address the considerations that must be taken into account by building officials regarding the placement and installation of NSSSs in buildings. The proposal would permit (but not require) the installation of a NSSS listed to the ISO standard, and provide an exception to the general requirement in the UPC that sanitation devices be connected to the building drainage system, unless a connection is required by the AHJ. Certain key protections, such as backflow prevention, proper ventilation of combustion-based units, and proper siting of storage tanks (if any) external to the unit are each specified in the proposal. The clearance requirements in Section “O” 301.3 correspond with the basic requirements found in the Uniform Mechanical Code, Section 304.1. Considerations of the use and disposal of outputs of the system are specifically referred to an AHJ, which would most likely be a health department.

Criteria for the functioning of the unit for its intended purpose are established by the ISO standard, and do not need to be repeated in plumbing code language. It should be noted that the ISO standard was developed by an international team of scientists, engineers, and regulators to assure the highest levels of treatment available would apply to all outputs (air, water and solids) from the device. The microbiological reduction requirements for solid and liquid waste are based on the quantitative microbial risk assessment (QMRA) method recognized by the World Health Organization for this purpose. The requirements of the standard mimic the highest quality standards imposed by regulatory agencies on waste-derived materials destined for reuse. The standard’s test procedures are rigorous (both lab and field tests are required), and the proposal allows only NSSSs listed to the standard to be approved for installation.
With reinvented toilets now on the cusp of commercialization, the arrival of toilets without water and sewer connections at job sites across the country can reasonably be expected by the time this code update is published and adopted by states and localities, e.g., 2025. Clear code language will accelerate the availability of safe sanitation for people who lack it today. While much is still unknown about the cost, maintenance, and reliability of NSSSs, or even the business model for their installation and servicing, forward-looking communities and jurisdictions with acute sanitation needs will want to be prepared for the safe installation and use of this promising new technology as it enters the market. This proposal lays the necessary groundwork for code officials to inspect and approve their installation, set out in an appendix available for voluntary adoption by state and local code bodies.
APPENDIX P
PROFESSIONAL QUALIFICATIONS

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 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.
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<td>Backflow Prevention Assembly Testers</td>
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<td>Cross-Connection Control Surveyors</td>
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<td>Fire Protection System Cross-Connection Control Tester</td>
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<td>Inspectors of Residential Potable Water Fire Sprinkler Systems for One- and Two-Family Dwellings</td>
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</table>

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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.
APPENDIX Q
THE SAFE OPERATION, CLOSURE AND REOPENING OF
BUILDING WATER SYSTEMS

Part I – General.

Q 101.0 General.
Q 101.1 Applicability. This appendix shall apply to risk management practices for all potable and non-potable water supply systems during normal operation, when closing, interruption to normal operation (system shutdown), and re-opening of all building occupancy types except for single- and two-family residential buildings. Part I shall apply to potable water systems and non-potable water systems. Part II shall apply to potable water systems. Part III shall apply to non-potable water systems.

Q 101.2 Building Water Systems. This appendix shall be applicable to building water systems for plumbing systems including the following:
(1) Potable water systems
(2) Non-potable water systems shall include, but not limited to, the following:
(a) Alternate water systems for outdoor use and indoor water use (dual plumbing systems)
(b) Utility supplied reclaimed water
(c) Rainwater catchment
(d) Gray water
(e) Landscape irrigation
(f) Decorative features
(g) Outdoor use systems (showers, hose bibs, etc.)

Q 101.3 Building Types. This appendix shall be applicable to the following building types:
(1) Non-residential (low- and high-rise)
(a) Office buildings
(b) Mercantile (seasonal retail)
(c) Schools/dormitories
(d) Hotels/motel
(e) Assembly
(f) Healthcare
(2) Residential
(a) All except single and double family residences

Q 201.0 Definitions.
Q 201.1 General. For the purpose of this appendix, the following definitions shall apply.
Building Water. Water collected, conveyed, circulated, stored, drained, or discharged by building plumbing systems for use in and around buildings.

Building Water Systems. Potable and non-potable water systems in the building, or on site.
Potable Water System. A building water distribution system that provides hot or cold water intended for direct or indirect human contact or consumption.

Risk. The potential to cause harm resulting from exposure.

Risk Management. Systematic activities to reduce risk.

SUBSTANTIATION:
The new section is being added to the UPC Appendix Q to address the safe operation, closure and reopening of building water systems. The additions in this section provide a broad overview of what building types and systems have an elevated risk profile for Legionella amplification and transmission. The definitions were added as these terms are needed for application, clarification and enforceability of the provisions above.
Proposals

Item #: 309

UPC 2024  Section: Q 201.0 - Q 201.1, Q 301.0 – Q 301.4.1.2

SUBMITTER: Gary Klein  
Self  
Chair, Potable Water Working Group

RECOMMENDATION: 
Add new text

Q 301.0 Water Management Program.
Q 301.1 Development. Where a water management program is not in place, a water management program shall be developed for the building water systems covered in this appendix according to ASHRAE 188 that addresses:
(1) All building water systems described in Section Q 101.2.
(2) The physical, chemical, and biological risks to the building water systems.
(3) The normal operation, shutdown, maintenance, and start-up of building water systems.
Q 301.2 Application. Where a water management program is in-place, it shall be reviewed prior to applying this manual to ensure it covers the above information. When a water management program is not in place, this information shall be compiled in order to apply this appendix. The following elements of a water management program shall be developed, in accordance with ASHRAE 188, prior to implementing this appendix:
(1) A program team shall be identified.
(2) The potable and non-potable building water systems shall be described, and process flow diagrams created.
(3) An analysis of the building water systems, including all engineering controls, shall be conducted and documented.

Note: ASHRAE 188 defines a water management program as “the risk management plan for the prevention and control of legionellosis associated with building water systems, including documentation of the plan’s implementation and operation.” Building water systems, including water supply and sanitary drainage, can present many additional risks to water quality and human health that warrant careful management of physical, chemical, and biological characteristics through a water management program.

Managing water quality can also improve the performance of building water systems and extend the life of plumbing system. Managing water in building plumbing systems further requires understanding and monitoring the interaction between supply water and premise plumbing systems, compelling coordination with water providers to ensure building managers are aware of upstream risks that may impact building water quality (see also Section Q 301.3 on utility coordination).

Q 301.3 Utility Coordinator. Information shall be obtained about the specific disinfection and corrosion control chemicals being used in the supply water to the building from the water utility, including the following:
(1) General water quality information
(2) Type and level of disinfectant residual
(3) Corrosion control chemicals added to the water
(4) Distribution system maintenance near the building
(5) Expected water quality changes

Note: It is important to notify the water utility of any sensitive water quality parameters for the building or facility, and to review/develop the notification protocol for significant water quality.

Q 301.4 Microbiological Testing. Microbial testing shall be done in accordance with Section Q 301.4.1 through Section Q 301.4.1.2.

Q 301.4.1 Laboratory Testing. Laboratory testing shall utilize culture testing methodology. Where a sample contains at least 1 CFU/mL or exceeds the limit of detection where the LOD of the method used is greater than 1 CFU/mL, the sample shall be deemed positive for Legionella.

Note: Other methodologies such as quantitative-polymerase chain reaction (qPCR) may be considered, usually in conjunction with the culture testing method.
**Q 301.4.1.1 Culture Testing.** Legionella culture testing shall be conducted by an accredited laboratory in accordance with the Authority Having Jurisdiction.

**Q 301.4.1.2 qPCR Testing.** When qPCR testing is used, Legionella pneumophila qPCR testing shall be conducted by an accredited laboratory in accordance with the Authority Having Jurisdiction.

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**Q 201.0 Definitions.**

**Q 201.1 General.** For the purposes of this appendix, the following definitions shall apply.

**Legionella.** The name of the genus of bacteria that can cause a pneumonia called Legionnaires’ disease or a flu-like illness called Pontiac fever when inhaled, aspirated, or directly introduced into the lungs of susceptible individuals.

Legionella are common aquatic bacteria found in natural and building water systems, as well as in some soils.

**Legionellosis.** The term used to describe Legionnaires’ disease, Pontiac fever, and any illness caused by exposure to Legionella bacteria.

**Program Team.** The group or individual designated by the building owner or designee to be responsible for developing, implementing, and maintaining the program.

**Risk.** The potential to cause harm resulting from exposure.

**Risk Management.** Systematic activities to reduce risk.

**System Reopening.** The set of actions that should be taken to ready a building for normal operations after an extended period of no or limited operations.

**Water Management Program (WMP).** A risk management plan to help building managers identify risks to water quality and establish clear guidelines for managing these risks at various points in the building lifecycle, including start-up, normal operation, under occupancy, water system shutdown, and water system restart. Such programs often focus on Legionella risk prevention, as required in some states for certain building types to combat waterborne pathogens such as Legionellosis.

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**SUBSTANTIATION:**
The new sections are being added to the UPC Appendix Q to address the safe operation, closure and reopening of building water systems. This section directs building owners with populations that are susceptible to Legionella outbreaks and provide the general framework to reduce the risk. The definitions were added as these terms are needed for application and enforceability of the provisions.
Proposals

Item #: 310
UPC 2024  Section: Q 201.0, Q 401.0

SUBMITTER: Gary Klein
   Self
   Chair, Potable Water Working Group

RECOMMENDATION:
Add new text

**Part II – Potable Water Systems.**
Reference sections need to be updated.

**Q 401.0 Potable Water Systems.**
**Q 401.1 General.** The five distinct building water conditions of a potable water system shall be as shown in Figure Q 401.1 and in accordance with the following:
(1) The building potable water system during construction activities shall be in accordance with Section Q 402.0.
(2) The building potable water system during normal operations shall be in accordance with Section Q 403.0.
(3) When there is an interruption to normal operations (system shut down process), the potable water system shall be in accordance with Section Q 404.0.
(4) When a building is vacant or partially occupied (system is shutdown), the potable water system shall be in accordance with Section Q 405.0.
(5) The potable water system during reopening shall be in accordance with Section Q 406.0.

**FIGURE Q 401.1**
**BUILDING WATER CONDITIONS**

**Q 401.2 Equipment Requirements.** Personnel that perform flushing shall utilize appropriate personal protective equipment (PPE) based on a task specific risk assessment and in accordance with OSHA requirements.
**Q 401.2.1 Other Equipment Requirements.** The following equipment shall be required for plumbing system evaluation:
(1) Sampling bottles or supplies for laboratory samples.
(2) Chlorine meter/test kit with an accuracy of +/- 3 percent.
(3) Digital thermometer for measuring water temperature with an accuracy of +/- 2°F (+/-1°C).
(4) Tools for removing aerators and supply stop covers (check with the appropriate manufacturers).

**Q 401.3 Water Stagnation.** Maintenance personnel shall take steps to prevent stagnant water in the potable water system in accordance with the water management program.
**Note:** These steps may include reducing the length of “dead legs” or lengths of pipe that are unused to prevent stagnation of water in piping systems.
Q 401.4 Water Purveyor Communication. The water utility provider shall be contacted prior to initiating the flushing process as required in Section Q 401.4.1 and the following:

1. Identify where the water purveyor is monitoring water quality nearest to the building in the distribution system and determine water quality at that location at present time and for the preceding years.
2. Verify that fresh utility water is available in the building's incoming water supply line.
3. Verify with the water utility provider on the expected disinfectant residual level in fresh utility water at your building.
4. The flushing process shall be in accordance with the Authority Having Jurisdiction. Where available, the Authority Having Jurisdiction's data sheets shall be utilized to document the flushing process. If items (1) through (3) are not possible, the regulated contaminants and disinfectants in the water supply for preceding years in the annual Consumer Confidence Report (CCR) shall be used.

Note: The frequency of maintenance, inspection, flushing, and monitoring may be established or adjusted in the water management program based on the following:
1. Lack of historical water quality results
2. Routine maintenance testing results that support an increased or reduced frequency
3. Changes in source incoming water (permanent, seasonal, or temporary)
4. Disruption in water quality due to main breaks, weather impacts, external construction, or any other factors
5. Building plumbing modifications
6. Building use and occupants served

Q 401.4.1 Water Draws for Testing. Water obtained for testing shall be drawn from the fixture in accordance with the following:

1. First Draw Test. Open faucet and collect water out of fixture to determine disinfectant residual.
2. Long Draw Test. Determine distance into water main or branch inside building that results are desired for. Calculate the time needed to flush (volume of water based on pipe size, divide by flow rate of fixture) and obtain water from that portion. Flush for the calculated time and collect sample.

Note: First-draw tests will give an impression of water quality that possible users would experience. The longer the flush before the draw, the further upstream in the piping system the test results will describe. Long-draw will give a better indication of the water quality in the water main.

Q 401.4.2 Locations for Testing. Sampling locations shall be in accordance with the CDC guidelines and ASHRAE 188. Testing shall be done at all plumbing fixtures in a building over a given period of time in accordance with the water management program. The following shall be considered when selecting locations:

1. Test fixtures that are frequently, moderately, and rarely used.
2. Test sites that are near the building water entrance, sites that are hydraulically remote (i.e., distal sites), and those that are in between.
   (a) Hydraulically remote locations shall not be required in the furthest room or sink from the water service entrance, but rather those locations that experience the least flow or have the highest-pressure loss through the piping system.
3. For systems with multiple zones or risers, sampling shall take place in each zone and riser.
4. Priority should be given to hot-water systems.
5. The Authority Having Jurisdiction shall be permitted to determine, on a case-by-case basis, where cold-water sampling shall be conducted.

Q 401.5 Water Quality. The building water quality shall be considered in accordance with the Authority Having Jurisdiction and Section Q 401.5.1 through Section Q 401.5.5. Additional monitoring and reporting of water quality shall be in accordance with the Authority Having Jurisdiction.

Q 401.5.1 Disinfectant Residuals Considerations. Disinfectant residuals shall be evaluated in the cold-water and hot-water system. The water system shall be tested for free chlorine or chloramine as required by the water purveyor (water utility). Free chlorine shall be measured where the water utility disinfects using free chlorine. Total chlorine shall be measured where the water utility disinfects using chloramine.

Note: Because chlorine residual is an important factor affecting microbial (Legionella) growth in building plumbing, all buildings should measure and record chlorine residuals. The measured chlorine residual is used to manage plumbing water age.

Q 401.5.2 Temperature. Temperatures shall be evaluated in both cold-water and hot water systems to maintain disinfectant levels.

Note: Because temperature is an important factor affecting microbial (Legionella) growth in building plumbing, all buildings should accurately measure and record water temperatures, and use this data to manage plumbing water age. Temperatures should be evaluated in both cold-water and hot water systems, as disinfectant levels in hot water are more difficult to maintain as oxidizing disinfectants dissipate more rapidly as temperature increases.

Q 401.5.3 Total Suspended Solids (TSS). The total suspended solids (TSS) shall be evaluated and shall be within the requirements as required by the water purveyor.

Note: Sediment in the water has an impact on plumbing systems as it can clog strainers and cause ball valves to seize. It also has an impact on the microbiology and disinfectant of the building as sediment can:
1. Reduce the residual disinfectant by consuming the disinfectant.
2. Provide a food source for bacteria, as sediment can and will provide a carbon source of various quantities to support bacteriological life.
3. Shield bacteria from disinfection as the pathogens can attach themselves to sediment. The sediment can then carry the pathogen into an area in the building where water quality conditions are ideal for its growth.
Sediment can increase in vacant buildings due to the oxidizing disinfectants corroding the metallic piping as the water is stagnant.

**Q 401.5.4 Legionella.** Water samples for Legionella culture shall be analyzed by an accredited laboratory in which Legionella culture appears on the laboratory’s scope of accreditation or a laboratory as approved by the Authority Having Jurisdiction.

**Note:** Knowing whether a building has Legionella, both in terms of concentrations and frequency of detection, enables an actual data-based assessment of building water quality and can guide appropriate actions to protect water users. This includes number of samples and locations that adequately represent the water system. Consider selecting a laboratory that has Legionella proficiency as demonstrated by Centers for Disease Control and Prevention (CDC) ELITE program certification or another internationally recognized proficiency program (such as the PHE Legionella isolation scheme).

**Q 401.5.5 Water Quality Data Tracking and Evaluation.** The water quality records and data shall be kept on file.

**Q 201.0 Definitions.**

**Q 201.1 General.** For the purposes of this appendix, the following definitions shall apply:

- **Building is Vacant or Partially-Occupied.** The state of a building water system when the building is closed and not in use (vacant) or major portions of the building water system is not in use or the typical use is significantly reduced (partially-occupied). This includes the off hours of operation and buildings that are shut down for long periods of time (weeks to years). This could include the construction period before initial opening.
- **Construction Activities.** The set of actions that are taken to ready a building for an initial occupancy.
- **Interruption to Normal Operations (System Shut Down Process).** The set of actions that should be taken to ready a building for an extended period of no or limited operations.
- **Initial/Remedial/Full Flush.** Initial/Remedial/Full flushing is a one-time event intended to replace all the water in the system with fresh water from the water supplier to reduce the presence and/or risk of exposure to contaminants (i.e., turnover approach).
- **Normal Operations.** The state of a building water system when the building is open and being used as intended. This includes the normal hours of operation and the number of people that occupy the building.
- **Potable Water System.** A building water distribution system that provides hot or cold water intended for direct or indirect human contact or consumption.
- **Process Flow Diagram.** A step by step drawing of a building water system that includes the location of all water processing steps – including, but not limited to, conditioning, storing, heating, cooling, recirculation, and distribution – that are part of the building water system.
- **System Reopening.** The set of actions that should be taken to ready a building for normal operations after an extended period of no or limited operations.

**SUBSTANTIATION:**

The new section is being added to the UPC Appendix Q to address the safe operation, closure and reopening of building water systems. This proposal describes the general concerns and conditions as it relates to Legionella amplification. These sections are general in nature and will be utilized in the various proposals that follow. The definitions were added as these terms are needed for application and enforceability of the provisions.
Proposals

Item #: 311
UPC 2024  Section: Q 402.0

SUBMITTER: Gary klein
Self
Chair, Potable Water Working Group

RECOMMENDATION:
Add new text

Q 402.0 Construction Activities.
Q 402.1 General. System opening is the set of actions that shall be taken to ready a building for normal operations after an extended period of no or limited operations. Systems that are being reopened after prolonged vacancy or partial vacancy shall comply with ASHRAE 188 and Section Q 402.0.
Q 402.2 Opening Process. The opening process of a building water system shall be in accordance with Section Q 402.2.1 through Section Q 402.6.
Q 402.2.1 Communication. An occupancy date and date of occupancy to all building occupants shall be determined and the steps required from maintenance staff shall be provided and available. The required steps shall provide instructions to occupants on how to avoid hazards and how to report concerns once building is occupied.
Q 402.2.2 Pre-Startup Inspection. The preparation of the documentation and pre-startup inspection shall be conducted by a qualified person or building owner designee. The required inspection shall include, but is not limited to, the following:
(1) Visually assessing the potable water system.
(2) Inspecting all components for the presence of contaminants and other adverse conditions.
(3) Checking that the equipment is working properly.
(4) Ensuring that records are complete.
Q 402.3 During Construction. The potable water system shall be left dry during construction until two weeks prior to occupancy.
Q 402.3.1 Water Fill Procedures. Wetted plumbing systems during construction shall comply with the following:
(1) Actions as described in Section Q 401.4 shall be performed in accordance with the water purveyor.
(2) Once acceptable water quality is verified, the cold and hot water distribution systems shall be filled with cold water. The required disinfectant at the percentage of plumbing fixtures shall be determined as required by the water management program.
Q 402.3.2 Flushing Procedure. Once the plumbing distribution system is filled with water, the following actions shall be taken until two weeks prior to occupancy:
(1) Remove aerators from all faucets and shower heads from all showers prior to commencing flushing.
(2) Turn on all water softeners, water filters, hot water recirculation pumps, etc. in accordance with the water management program. Water heaters shall remain off.
(3) The incoming water temperature and water temperature at plumbing fixtures shall be monitored and the following actions shall be taken:
(a) For parts of the building where the temperature is more than 75°F (24°C) (e.g., unconditioned), identify the temperature of incoming domestic cold water and flush 100 percent of domestic piping systems in these areas daily to maintain within 5°F (2.8°C) of incoming water temperature.
(b) For parts of the building where the temperature is 75°F (24°C) or less (e.g., wintered or conditioned), complete actions Q 402.3.2(4) through Section Q 402.3.2(6).
(4) Flush twice the storage volume of the piping in each area or zone of the building and each plumbing fixture.
(5) The water heater shall have at least 100 percent of water displaced every 7 days.
(6) Flush not less than 15 percent of all plumbing fixtures (hot and cold) per day. Every 7 days at least 100 percent of the building plumbing fixtures (hot and cold) shall be flushed.
Q 402.3.3 Disinfectant Residual. Not less than 5 percent and not more than 20 randomly selected plumbing fixtures shall be tested monthly for disinfectant residual. If residual is less than 0.2 ppm of chlorine or chloramine, the following actions shall be taken:
(1) The water utility shall be contacted to open the fire hydrant near building. This shall be completed prior to commencing any flushing inside the building.
(2) Retest water after this step to determine if disinfectant residual is present.
(3) If disinfectant residual is still low after repeating the steps above, a supplemental disinfection for the building potable water systems shall be installed.

Q 402.3.4 Testing for Legionella. For buildings with populations that are susceptible to Legionella, at least 5 percent but not more than 20 randomly selected plumbing fixtures shall be tested daily for Legionella.

Q 402.3.5 Remedial/Full/Turnover-Approach Flush. If a building under construction has water in it for more than one week without commencing any daily flushing protocols as indicated in Section 402.3.2, a remedial flush will be needed prior to commencing daily flushing. A remedial flush shall be conducted in the following manner:
(1) Remove aerators from all faucets and shower heads from all showers prior to commencing flushing.
(2) Turn on all water softeners, water filters, hot water recirculation pumps, etc. in accordance with the water management program. Water heaters shall remain off.
(3) Systematically flush each main, branch, and fixture branch on the cold and hot water piping systems.
(4) The water shall flow at a rate to scour the pipes at not less than 2 feet per second (ft/s) (0.6 m/s).
(5) At least twice the storage volume of the cold and hot water piping in each area or zone of the building and each plumbing fixture shall be flushed. Continue flushing until the disinfectant residual target has been reached for both the cold and hot water.

Q 402.4 Charge in Plumbing System. At least two weeks prior to occupancy, the plumbing system has remained dry, the system shall be filled in accordance with Section Q 402.3.1.

Q 402.4.1 Disinfection of Potable Water System. The disinfection of the potable water systems shall be in accordance with Section 609.10. This procedure applies to hot and cold-water piping systems and shall be performed 7 days prior to opening. The water heater shall remain off.

Q 402.4.2 Daily Flushing. A flushing protocol as indicated in Section Q 402.3.2 shall be implemented.

Q 402.4.3 Testing for Chlorine. At least 5 percent but not more than 20 randomly selected plumbing fixtures shall be tested daily for disinfectant residual. If residual is less than 0.2 ppm of chlorine or chloramine, the following actions shall be taken:
(1) Contact the water utility to open the fire hydrant near building. This shall be completed prior to commencing any flushing inside the building.
(2) Retest water after this step to determine if disinfectant residual is present.
(3) If disinfectant residual is still low after repeating the steps in Section Q 402.4.3(1) and Section Q 402.4.3(2), a supplemental disinfection for the building potable water systems shall be installed.

Q 402.4.4 Testing for Legionella. For buildings with populations that are susceptible to legionella, test at least 10 randomly selected plumbing fixtures from each hot water system once for legionella. Samples shall be collected at least 2 per floor and shall be hot water. Where applicable, the following actions shall be taken:
(1) Coordinate testing with laboratory to determine if expedited results can be provided. Considerations shall be made for utilizing rapid testing methods (qPCR) to supplement laboratory testing during this time.
(2) Any further testing shall be dictated by time (extended beyond 2 weeks) or corrective actions. Fixtures that repeatedly tests positively for legionella (greater than or equal to 1 CFU/mL) shall be flushed daily in accordance with the flushing protocol until opening. Continue testing these sites. Considerations shall be made for contacting a water treatment professional.
(3) Where more than 30 percent of randomly selected sites continually test positive for Legionella (greater than or equal to 1 CFU/mL), a water treatment professional shall be contacted.

Q 402.4.5 Hot Water System Start-Up. The start-up of a water heater shall not be initiated until after the occupancy date has been confirmed and the cold and hot water disinfectant residual meets the requirements as outlined in Section Q 402.4.3 and Section Q 402.4.4. The water heater shall be turned on within one week prior to occupancy and shall be in accordance with the following:
(1) Commission hot water system, verifying flow rates, temperatures, and hot water recirculation pumps are operating correctly.
(2) The hot water system shall be balanced.
(3) Confirm that all thermostatic mixing valves are operational and are not damaged/plugged.
(4) Monitor supply and return water temperatures. The temperature shall be not less than 140°F (60°C) on the supply and 122°F (50°C) on the return. If the building owner is utilizing supplemental disinfection, the minimum supply and return temperatures shall be permitted to be lowered in accordance with water treatment professional and/or water management team approval.

Q 402.6 Complete Installation. The following installation requirements shall be verified:
(1) Faucet aerators and shower heads shall be installed.
(2) Hot water delivery times shall be confirmed that at all hot water plumbing fixtures meet the manufacturer’s specifications.
SUBSTANTIATION:
The new section is being added to the UPC Appendix Q to address the safe opening of newly constructed building water systems. Flushing protocols have been added to reduce the risk of stagnant waters and microbiological activity amplification during construction. Current construction practices, by not flushing the water daily/weekly allows disinfectant to dissipate and microbiological activity to amplify. By either keeping plumbing systems completely dry or flushing regularly once water is introduced the goal is to minimize biofilm and pathogen growth that could become an issue for building occupants later. This is especially critical for facilities such as healthcare and hospitality facilities where Legionella cases tend to occur the most. Regular flushing of water allows water with dissipated disinfectant to be replaced with water that has disinfectant in it. Additionally, flushing the water lines helps remove the accumulation of sediment and heavy metals, which can reduce residual disinfectant or create health issues themselves. Finally, flushing helps mitigate the accumulation of biofilm in plumbing systems, reducing the potential of future "hosts" of waterborne pathogens. Similar to Section Q 405.0 (Vacant or Partially Occupied Buildings) where a building is shutdown, regular flushing can help reduce the risk of issues.
Item #: 312
UPC 2024  Section: Q 403.0 – Q 403.3, Table Q 403.3

SUBMITTER: Gary Klein
Self
Chair, Potable Water Working Group

RECOMMENDATION:
Add new text

Q 403.0 Normal Operation.
Q 403.1 General. System opening is the set of actions that shall be taken to ready a building for normal operations after an extended period of no or limited operations. Normal operation shall be when the state of a building water system is open and being used as intended. Systems that are being reopened after prolonged vacancy or partial vacancy shall comply with ASHRAE 188 and this section.

Q 403.2 Potable Water Supply. The potable water supply system shall include water that is satisfactory for drinking and culinary purposes, and that meets the requirements of the Authority Having Jurisdiction. For the purposes of this appendix, the potable water supply shall be from the meter to the points of use.

Section Q 403.0 shall apply to routine procedures during normal operation that work to maintain safe water qualities in building water systems and to avoid excessive water aging, and the harmful effects of waterborne pathogens. The required routine maintenance, inspection, flushing, and monitoring shall be the responsibility of the property owner unless otherwise required by the Authority Having Jurisdiction.

Q 403.3 Equipment Inspection. Equipment shall be inspected in accordance with the water management program and this Section. The equipment shall be serviced, repaired or replaced as needed. For the purposes of this appendix, equipment shall include, but not be limited to, the following:

1. Water heaters
2. Backflow preventers
3. Water treatment equipment
4. Other equipment connected at the entrance to the potable water supply system

Equipment in the mechanical room or the entrance to the building potable water supply system shall be checked for physical integrity and general function. Maintenance records shall be checked to confirm maintenance activities are up to date. Service contracts shall be checked to determine that regular service is being performed and that contractor recommendations are implemented. When maintenance is out of date, or a specific issue is identified, the equipment shall be maintained in accordance with the manufacturer’s instructions or the registered design professional’s requirements. Where the manufacturer’s instructions do not provide inspection and maintenance frequency, the potable water systems and components shall be inspected and maintained in accordance with Table Q 403.3. Inspection, testing and maintenance records shall be maintained.
**TABLE Q 403.3**
MINIMUM POTABLE WATER SOURCE INSPECTION, TESTING AND MAINTENANCE FREQUENCY
DURING NORMAL OPERATION

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MINIMUM FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect and verify water softeners and point-of-entry filtration devices are operational and maintaining minimum water quality requirements.</td>
<td>Follow manufacturer instructions.</td>
</tr>
<tr>
<td>Maintain water softeners and point-of-entry filtration devices.</td>
<td>As needed.</td>
</tr>
<tr>
<td>Inspect pumps and valves, and verify operation</td>
<td>After initial installation and every 3 months thereafter</td>
</tr>
<tr>
<td>Maintain pumps and valves</td>
<td>As needed.</td>
</tr>
<tr>
<td>Inspect water heaters or boiler</td>
<td>Every 3 months</td>
</tr>
<tr>
<td>Flush water heater under pressure until water runs clear</td>
<td>Every 12 months</td>
</tr>
<tr>
<td>Maintain water heaters</td>
<td>As needed</td>
</tr>
<tr>
<td>Inspect and test pressure type vacuum breaker, double check, reduce pressure principle backflow prevention devices and test</td>
<td>After initial installation or after any construction renovation or addition, and every 12 months thereafter</td>
</tr>
<tr>
<td>Repair and replace pressure type vacuum breaker, double check, reduce pressure principle backflow prevention devices and test</td>
<td>As needed.</td>
</tr>
<tr>
<td>Inspect point-of-use filters and screens including drinking fountain, aerators, and bottle filling stations</td>
<td>Every 3 months</td>
</tr>
<tr>
<td>Clean filters and screens including aerators, drinking fountain and bottle filling stations; and replace</td>
<td>As needed.</td>
</tr>
<tr>
<td>Inspect caution labels and markings</td>
<td>After initial installation and every 12 months thereafter</td>
</tr>
<tr>
<td>Replace caution labels and markings</td>
<td>As needed</td>
</tr>
<tr>
<td>Inspect and test eyewash stations and safety showers</td>
<td>At least weekly, in accordance with ISEA Z358.1, the Authority Having Jurisdiction, and the manufactures instructions.</td>
</tr>
<tr>
<td>If installed: Inspect and verify that supplemental disinfection systems are operational and maintaining minimum water quality requirements as determined by the Authority Having Jurisdiction</td>
<td>Follow manufacturer instructions, water treatment guidelines, and Authority Having Jurisdiction requirements</td>
</tr>
<tr>
<td>If installed: Maintain disinfection and water quality treatment devices and systems</td>
<td>As needed.</td>
</tr>
</tbody>
</table>

**SUBSTANTIATION:**
The new section is being added to the UPC Appendix Q to address the safe operation of building water systems during normal operating conditions. This section gives a broad overview of procedures and practices to help reduce the risk of a Legionella outbreak.
Item #: 313
UPC 2024  Section: Q 403.4 – Q 403.4.5

SUBMITTER: Gary Klein
Self
Chair, Potable Water Working Group

RECOMMENDATION:
Add new text

**Q 403.4 Water Quality Monitoring.** The water quality monitoring of the potable water system shall be in accordance with Section Q 403.4.1 through Section Q 403.4.3.

**Q 403.4.1 Building Characterization.** The building types shall be as listed in ASHRAE 188 such as multiple housing units with a centralized water heater system, buildings over 10 stories with plumbing systems, chemotherapy patients, diabetes, and occupants over 65 years old.

Note: Not all buildings are at equal risk for a waterborne pathogen outbreak, specifically Legionella species. The building types that are at highest risk typically encompass complex plumbing systems and/or have populations that are immuno-compromised.

**Q 403.4.2 Sample Protocol.** Samples shall be collected from the same fixture locations and in accordance with Section Q 403.4.3 using first-draw samples in accordance with Section Q 401.4.1(1) and long-draw samples in accordance with Section Q 401.4.1(2).

**Q 403.4.3 Location for Testing.** Testing locations shall be done at one hundred percent of all distal sites in a building over a given period in accordance with the water management program. A certain percentage of strategically selected plumbing fixtures shall be tested per sampling event. Some considerations in selecting locations shall include, but not be limited to, the following:

1. Test fixtures that are frequently, moderately, and rarely used.
2. Test sites that are near the building water entrance, sites that are hydraulically remote (i.e. distal sites), and those that are in between.
3. Locations that experience the least flow or have the highest-pressure loss through the piping system.

**Q 403.4.3.1 Disinfectant Residual Testing Locations.** The building owner shall establish routine monitoring sites as part of the water management program. To determine where to measure chlorine residuals in the building, an initial residual characterization survey shall be conducted in accordance with the following:

1. Measure and record disinfectant residuals at all locations where utility water enters the building(s).
2. Using the list of plumbing fixtures, as described in the water management program, measure and record the disinfectant residual of at least 5 percent of randomly selected faucets, lavatories, showers, drinking fountains, and ornamental fountains throughout the building for both hot and cold water.
3. Determine which plumbing fixture locations require first-draw or long-draw testing, as required in Section Q 401.4.1. Some locations may have both types of water draws.
4. These routine sites shall be chosen to include some sites that had:
   a. The lowest disinfectant residual.
   b. Serve sensitive users.
   c. That will be used for any ongoing microbial monitoring.

**Q 403.4.3.2 Temperature Testing Locations.** The building owner shall establish routine monitoring sites for temperature as part of the water management program. To determine where to measure these temperatures in the building, an initial temperature characterization survey shall be conducted in accordance with the following:

1. Measure and record temperature at all locations where utility water enters the building(s).
2. Using a list of plumbing fixtures (described in the water management program) measure and record the disinfectant residual of at least 5 percent of randomly selected faucets, lavatories, showers, drinking fountains, and ornamental fountains throughout the building for both hot and cold water.
3. The temperature characterization shall be done in conjunction with the disinfectant residual characterization.
Hot water temperatures shall be measured exiting the water heater, exiting the master mixing valve, and if applicable on the hot water recirculation return pipe before entering the water heater.

**Q 403.4.3.3 Legionella Testing Locations.** For buildings with populations that are susceptible to Legionella, the building owner shall establish routine monitoring sites for Legionella as part of the water management program. To determine where to measure Legionella in the building, an initial characterization survey shall be conducted in accordance with the following:

1. Measure and record legionella (CFU/mL) at all locations where utility water enters the building(s).
2. Using a list of plumbing fixtures, as described in the water management program, measure and record legionella (CFU/mL) of at least 5 percent of randomly selected faucets, lavatories, showers, drinking fountains, and ornamental fountains throughout the building for both hot and cold water.
3. The legionella characterization shall be done in conjunction with the temperature and disinfectant residual characterizations.

**Q 403.4.3.4 Supplemental Disinfectant Residual Testing Locations.** For buildings that utilize supplemental disinfection technologies, the frequency and locations of testing shall comply with state, federal, and Authority Having Jurisdiction requirements.

**Q 403.4.4 Monitoring Frequency.** Monitoring and testing frequency shall be in accordance with Section Q 403.4.4.1 through Section Q 403.4.4.4.

**Q 403.4.4.1 Disinfectant Residual Frequency.** The building owner shall establish routine disinfectant monitoring frequencies as part of the water management program. Routine disinfectant monitoring frequencies shall be in accordance with the following:

1. Measure and record inlet disinfectant residuals as dictated by the water management program but no less than monthly. Adjust applicable control measures based on results.
2. Measure and record disinfectant residuals at the other routine sampling sites 3 days a week or the frequency determined by the water management program, whichever is more frequent. Select the sample time to account for changes in variation of the occupancy. Adjust applicable control measures based on results.
3. Consult with the Authority Having Jurisdiction for appropriate actions based on the result of testing.

Disinfectant residuals shall be maintained to prevent Legionella growth in hot and cold-water systems in accordance with ASHRAE 188, ASHRAE Guideline 12, and the Authority Having Jurisdiction.

**Q 403.4.4.2 Temperature Monitoring Frequency.** The owner shall establish routine temperature monitoring frequencies as part of the water management program. Routine disinfectant monitoring frequencies shall be in accordance with the following:

1. Measure and record inlet cold water temperature and hot water temperatures exiting the water heater, exiting the master mixing valve, and if applicable on the hot water recirculation return pipe before entering the water heater. This shall be done daily. Adjust applicable control measures based on results.
2. Measure and record the temperature of the cold and hot water at the same time, same location, and frequency as disinfectant residuals are measured. Adjust applicable control measures based on results.
3. Consult with the Authority Having Jurisdiction for appropriate actions based on the result of testing.

Water temperatures shall be maintained to prevent Legionella growth in hot and cold-water systems in accordance with ASHRAE 188, ASHRAE Guideline 12 and Appendix N of this code.

**Q 403.4.4.3 Legionella Monitoring Frequency.** For buildings with populations that are susceptible to Legionella, the owner shall establish routine Legionella monitoring frequencies as part of the water management program. Routine Legionella monitoring frequencies shall be in accordance with the following:

1. Measure and record every month for the first year. Adjust applicable control measures based on results.
2. Re-evaluate monthly and adjust monitoring frequency based on facility risk assessment and results.
3. Consult with the Authority Having Jurisdiction for appropriate actions based on the result of testing.

**Q 403.4.4.4 Supplemental Disinfection Monitoring Frequency.** For buildings that utilize supplemental disinfection technologies, the frequency and locations of testing shall comply with state, federal, and the Authority Having Jurisdiction requirements.

**Q 403.4.5 Routine Flushing (Normal Operations).** Flushing during normal operations shall comply with ASHRAE 188, CDC guidelines, and the building water management program. Flushing considerations shall be made for the following:

1. Flush fixtures that are frequently, moderately, and rarely used.
2. Flush sites that are near the building water entrance, sites that are hydraulically remote (i.e., distal sites), and those that are in between.
3. Locations that experience the least flow or have the highest-pressure loss through the piping system.

**SUBSTANTIATION:**
The new section is being added to the UPC Appendix Q to address the safe operation of building water systems during normal operating conditions. This section gives better definition to the criteria that should be considered as part of a water management program and the frequency and location of control measures.
Proposals

Item #: 314
UPC 2024 Section: Q 403.4.6, Table Q 403.4.6

SUBMITTER: Gary Klein
Self
Chair, Potable Water Working Group

RECOMMENDATION:
Add new text

**Q 403.4.6 Summary of Location and Frequency of Monitoring.** The suggested minimum frequency and locations of monitoring for water quality shall be in accordance with Table Q 403.4.6.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MINIMUM FREQUENCY³</th>
<th>SAMPLE AT BUILDING ENTRANCE</th>
<th>SAMPLE AT RANDOMLY SELECTED PLUMBING FIXTURES (INCLUDING DISTAL SITES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disinfectant residuals</td>
<td>Monthly</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Water Temperature (hot and cold)</td>
<td>Weekly</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Legionella</td>
<td>Monthly</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Additional Water Quality Considerations for Improved Control (Not Required)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPC</td>
<td>Quarterly</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>Monthly</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>pH</td>
<td>Monthly</td>
<td>X</td>
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<tr>
<td>DBP</td>
<td>Monthly</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Corrosion Inhibitors</td>
<td>Quarterly</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Additional Water Treatment</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Supplemental Disinfection (If added to building)</td>
<td>In accordance with Authority Having Jurisdiction</td>
<td>In accordance with Authority Having Jurisdiction</td>
<td>In accordance with Authority Having Jurisdiction</td>
</tr>
</tbody>
</table>

Notes:

1. Frequencies are based on good results. When unacceptable results are found, seek guidance from the Authority Having Jurisdiction.
2. The target setpoints are based on the water management program.
3. Testing may be performed more frequently than noted above. At a minimum, the testing frequency noted in the table above shall be performed with the laboratories and methods as noted in this appendix.
4. Required only if building population is susceptible to Legionella. If not, then this shall be considered an “Additional Water Quality Considerations for Improved Control” (Not Required) in accordance with Table Q 403.4.6.
5. Also consider sampling near central water heater or hydronic equipment to help determine impact on energy usage.
SUBSTANTIATION:
The new section is being added to the UPC Appendix Q to address the safe operation of building water systems during normal operating conditions. This section summarizes the information in new proposed Section Q 403.4 (Water Quality Monitoring).
Q 404.0 Interruption to Normal Operation-System Shutdown Process.
Q 404.1 General. Interruption to normal operations (system shutdown Process) shall be the set of actions that is taken to ready a building for an extended period of no or limited operations. Systems that are being shutdown shall comply with ASHRAE 188 and Section Q 404.0.
Q 404.2 Communication. An announcement of a planned shutdown date of shall be provided to all building occupants with clear communication on what steps maintenance staff will take. The announcement shall include if shut down will be a complete or a partial shutdown.
Q 404.3 Shutdown. System shutdown shall be completed by shutting down the entire system or portions of a system in accordance with Section Q 404.3.1 or Section Q 404.3.2.
Q 404.3.1 Complete Shutdown. During complete shutdown, the building shall be occupied by only maintenance personnel or shall not be occupied. The following actions shall be considered to shut down building water system completely:
(1) Limit use of potable water to one bathroom nearest the building water service entrance.
(2) Turn off water heater, and flush water heater to displace a minimum of 100 percent of water volume in tank. Flush tank under pressure to remove as much biofilm/scale/build-up within tank as possible.
(3) Keep hot water recirculation pump on to circulate non-heater hot water.
(4) Keep any water softener, water filtration device, and any supplemental disinfection equipment on.
(5) Leave booster pump system operational.
(6) Leave all domestic water systems fully pressurized.
Q 404.3.2 Limited Operations-Partial Shutdown. Limited operation shall be when portions of the building are occupied while other portions of the building become unoccupied. Where the majority of the building is unoccupied, but some portion of a building is open to the public or non-staff occupants, the building shall be considered partially occupied.
Note: Partially occupied buildings present one of the greatest challenges to public health and safety, and owners should proceed very carefully when operating their buildings in this manner.
The following actions shall be considered to partially shut down building water system:
(1) Limit use of potable water by public or occupants to designated areas only that have regular usage.
(2) Do not isolate one side of the building from the other, all domestic water equipment should remain fully operational.
Q 404.4 Shutdown Testing and Inspection. The shutdown testing and inspection of the building water supply shall be in accordance with Section Q 404.4.1 through Section Q 404.4.3.
Q 404.4.1 System Inspection. On shutdown date, the potable water system shall be inspected in its entirety.
Q 404.4.2 System Documentation. Detailed records of all procedures, actions performed, and test results shall be kept. As-Built drawings of entire system including plans and diagrams shall be obtained. Where as-built drawings are not available, one shall be developed by a registered design professional including the following:
(1) The volume of entire water system including each fixture branch.
(2) The flushing times for the building in its entirety and each individual fixture.
Q 404.4.3 Baseline Test. Water samples from approximately 10 percent of plumbing fixtures and baseline values shall be determined for not less than the following:
1. **Incoming water disinfectant residual**
2. **Incoming Legionella positivity**
3. **Incoming water turbidity**
4. **Ten percent of plumbing fixtures for Legionella positivity**

**SUBSTANTIATION:**
The new section is being added to the UPC Appendix Q to address the safe closure of building water systems. This section was added to specifically indicate the specific set of actions to prepare a building for an extended period of time where a building is either fully or partially vacant. These actions prepare the building in a manner to be more easily maintained, as outlined in new proposed Section Q 405.0.


Q 405.0 Vacant or Partially Occupied Buildings.

Q 405.1 General. Buildings shall be considered vacant or partially occupied (system is shutdown) when the building is closed and not in use (vacant) or major portions of the building water system are not in use (partially occupied). This includes the off hours of operation and buildings that are shut down for long periods of time (weeks to years). Systems that are being shutdown shall comply with ASHRAE 188 and Section 405.0.

Note: A building may also be considered vacant or partially occupied during the construction period before initial opening.

Q 405.2 Shutdown. System shutdown shall occur by shutting down the entire system or portions of a system.

Q 405.2.1 Complete Shutdown. Complete shutdown shall be when no one occupies the building other than maintenance personnel. The following protocols and actions shall be taken during complete shutdown:

1. Limit the use of potable water to one bathroom nearest the building water service entrance.
2. Remove aerators from all other faucets and shower heads from all other showers prior to commencing flushing.
3. Turn on or leave on all water softeners, water filters, hot water recirculation pumps, and other similar equipment in accordance with the water management program. Water heaters shall remain off.
4. Monitor incoming water temperature and water temperature at plumbing fixtures. Take the following actions:
   a. For parts of the building where the temperature is above 75°F (24°C) (e.g., unconditioned), identify temperature of incoming domestic cold water, and flush 100 percent of domestic piping systems in these areas daily to maintain within 5°F (2.8°C) of incoming water temperature.
   b. For parts of the building where the temperature is less than or equal to 75°F (24°C) (e.g., wintered or conditioned), complete actions required in Section Q 405.2.1(5) through Section Q 405.2.1(7).
5. Flush twice the storage volume of the piping in each area or zone of the building and each plumbing fixture.
6. The water heater shall still be off and pressurized. The water heater shall have at least 100 percent of water displaced every 7 days.
7. Flush 15 percent of all plumbing fixtures (hot and cold) per day, every 7 days. At least 100 percent of the building plumbing fixtures (hot and cold) shall be flushed.

Q 405.2.2 Partial Shutdown. Partial shutdown shall be when portions of the building are occupied while other portions of the building become unoccupied. Where the majority of the building is unoccupied, but some portion of a building is open to the public or non-staff occupants, the building shall be considered partially occupied.

Note: Partially occupied buildings present one of the greatest challenges to public health and safety, and owners should proceed very carefully when operating their buildings in this manner.

The following protocols and actions shall be considered during partial shutdown:

1. The building owner shall identify what normal water usage was prior to partial-shutdown and complete a daily flush to simulate typical daily water usage.
2. Limit the use of potable water by public or occupants to designated areas only that have regular usage.
3. Remove aerators from all faucets and shower heads from all showers prior to commencing flushing.
4. Test incoming water for disinfectant residual. If residual reduces from baseline, as measured in Q 404.4.3, or reduces to less than 0.2 ppm of chlorine or chloramine, the following actions shall be taken:
   a. Contact water purveyor to determine the scope of the problem.
   b. Coordinate with water purveyor to determine if they can open fire hydrant near building. This shall be completed prior to completing any flushing inside the building.
Q 405.3 Flushing Concept. Flushing while a building is vacant or partially occupied (system is shutdown) shall be done in accordance with Section Q 405.3.1 through Section Q 405.3.4.

Q 405.3.1 Flushing Protocol. The flushing of stagnant water of the cold-water system and hot water system shall be conducted for the building water system by turning over the water system through regular use and/or flushing. Faucets, showers, and other distal sites shall be opened to replace water within the building plumbing with fresh water. The flushing method used shall be done in accordance with one of the following methods:

(a) The plume-method using the flush method in accordance with Section Q 405.3.2.

(b) The longest-pull method using the flush method in accordance with Section Q 405.3.3.

Note: Flushing (duration, frequency, and repetition) overall has not been validated to prevent/remove WBPs and needs to be determined at the facility-specific level. What amount/level of flushing works for one building may not work for a larger or smaller or more complex building. Consult with the water management team, professional engineer, water treatment professional, or other water/plumbing consultant would be beneficial to determine how well the flushing is working. Additionally, collecting samples of water validation will be needed to verify effectiveness of flushing protocols.

Q 405.3.2 Plume Method. The plume method shall be the flushing protocol that proceeds from the service line toward locations farther from the point of entry.

Note: The “plume” of water with disinfection is slowly drawn further and further into the building, going from the water service entrance gradually to the furthest distal site.

Example: A flushing protocol that pulls water from the ground level, then to the 1st floor, then to the 2nd floor, then to the 3rd floor, and finally to the 4th floor.

The flushing protocol shall start on the basement or lowest level of the building at the fixture closest to the incoming flow of water.

Note: This will flush the water service line(s), bring fresh utility water into the building and completely flush the hot water system. Utility sink or floor sink faucets, such as those found in basements or janitor closets, typically have higher flow rates to facilitate the fast filling of buckets, etc. This makes them ideal for beginning the flushing process. If a service sink or floor sink is not available, go to the sink.

Q 405.3.3 Longest-Pull Method. The longest-pull method shall be the flushing protocol that attempts to pull water from the water service entrance directly to furthest distal site.
Note: This is typically done by instituting a longer flush time at the furthest fixture, in order to displace 100 percent of the water in between. Each area between the water service entrance and furthest distal site is flushed at shorter intervals, thereby pulling water with disinfectant residual from the replenished mains.

Example: A flushing protocol that pulls water from the ground level and then proceeds to flush for a longer time the 4th floor. Once this step is complete, flushing occurs at the 2nd and 3rd floor in no particular order. The flushing protocol shall start on the basement or lowest level of the building at the fixture closest to the incoming flow of water.

Note: This will flush the water service line(s), bring fresh utility water into the building and completely flush the hot water system. Utility sink or floor sink faucets, such as those found in basements or janitor closets, typically have higher flow rates to facilitate the fast filling of buckets, etc. This makes them ideal for beginning the flushing process. If a service sink or floor sink is not available, go to the sink.

Q 405.3.4 Hybrid Method. The hybrid method shall be when the flushing protocol includes any combination of the plume- or longest-pull-methods.

Q 405.4 Flushing Concerns. The following shall be considered when conducting the flushing protocol:

(1) Do not open 100 percent of plumbing fixtures within a building or area of the building when flushing. Note: This will exceed the design parameters (i.e., Hunter’s Curve) value of the building and could lead to siphoning of the water within the building.

(2) Contact the sewer provider for the building prior to flushing as water with high concentrations of disinfectant in it could create issues at the wastewater treatment plant.

(3) Buildings with a dedicated place to fill water bottles or drinking fountains shall consider making those devices inoperable and placing signage prohibiting public from utilizing devices.

(4) Steps shall be taken to maintain a fluid trap seal on drain waste and vent system. Verify that trap primers are operable and that traps that are served by trap primers (particularly pressure-differential trap primers) are not caused to be inoperable with flushing protocol.

(a) Sewer gases, floor drains and traps: If an overwhelming smell of sewer gas is detected in the building or when entering bathrooms that have been unused for long periods of time, the floor traps or fixture traps shall be checked to determine if they have run dry. If high concentrations of sewer gases are suspected in the building, the building shall be evacuated, and the local fire department shall be contacted to assess the condition.

(b) The plumbing system shall be checked to ensure there are no dry traps. The building shall be inspected. Clean water shall be poured into floor drains and sinks to fully restore trap seals.

Note: Any dry trap provides a potential pathway for exposure to the virus and other harmful microorganisms to spread.

(1) The drainage system shall be checked for blockages prior to initiating the flushing process. A room shall not be left unattended while the flushing process is ongoing.

(2) When flushing urinals, consider covering the urinal with a plastic bag to trap aerosols if numerous, repetitive flush activations are required.

SUBSTANTIATION:
The new section is being added to the UPC Appendix Q to address the safe closure and reopening of building water systems. This new proposed Section Q 405.0 (Vacant or Partially Occupied Buildings), addresses the actions a building should take during extended partial or full vacancy to prevent the amplification of waterborne pathogen and the deterioration of water quality. Regular flushing of water allows water with dissipated disinfectant to be replaced with water that has disinfectant in it. Additionally, flushing the water lines helps remove the accumulation of sediment and heavy metals, which can reduce residual disinfectant or create health issues themselves. Finally, flushing helps mitigate the accumulation of biofilm in plumbing systems, reducing the potential of future “hosts” of waterborne pathogens. Similar to Section Q 402.0 (Construction Activities), regular flushing during extended shutdown can help reduce the risk of future issues.
Q 405.5 Flushing Consideration. Flushing considerations when the building is vacant or partially shutdown (system is shutdown) shall be in accordance with Section Q 405.5.1 through Section Q 405.5.4.

Q 405.5.1 Flushing Times and Cycle. Stagnant water shall be removed from potable water supply lines. A registered design professional or plumbing professional shall be consulted to determine the number of flushes and flush times required to remove the stagnant water from the water supply lines.

Q 405.5.2 Faucet Flushing. When flushing faucets, the faucet aerator shall be removed, where applicable. The flushing shall be done as follows:
1. Open the sink faucet’s cold-water valve first to the highest flow rate possible without creating excessive splashing.
2. Ensure that the sink drain can handle the flow of water without backing up and overflowing the sink. Using a digital thermometer to check water temperature, flush until the water temperature stabilizes.
3. Turn off the cold valve and repeat the above process with the hot water valve.
4. Flush the hot water system until the temperature reaches the same temperature as the cold water.
Note: This may take considerably longer depending on the volume of water in the hot water system.
5. Clean and replace the faucet aerator.

Q 405.5.3 Bathroom-Group, Plumbing Fixture Flushing. When flushing bathroom-groups, the following flushing protocol shall be conducted:
1. Flush toilet and urinal supply lines first, where applicable. Start with the fixture that is farthest away from the incoming flow of water and work back towards the incoming flow of water. The stagnant water shall be removed from the potable water supply lines. A registered design professional or plumbing professional shall be consulted to determine the number of flushes required to remove the stagnant water from the water supply lines.
   The water lines servicing toilets or water closets can be flushed without excessive repetitive flush activations.
   Note: The water closet tank flapper can be removed or the flushometer-valve can be temporarily disabled to provide for a run-on condition. This will flush cold water lines directly into the sanitary drain quickly and efficiently, and will also reduce the generation of aerosols. It is not recommended to put flushometer-valves servicing urinals into a run-on condition due to small trap diameters in urinal fixtures which could result in overflows. Consult manufacturer to determine if this is an option.
2. Using the appropriate tool, the aerator from faucets shall be removed. The flushing shall be done as follows:
   a. Flush the cold water. Ensure that the sink drain can handle the flow of water without backing up and overflowing the sink.
   b. Using a digital thermometer, the water temperature shall be checked. Flush until the water temperature stabilizes.
   c. The hot water line shall be flushed using the same process in Section 405.5.3(2)(a) and Section 405.5.3(2)(b).
   d. Test for residual chlorine. Using an approved chlorine testing device, check for the presence of residual chlorine at several bathroom locations. The location farthest away from the incoming flow of water shall be tested. Additional flushing shall be required until a chlorine residual is determined at all outlets. If, after additional flushing, residual chlorine is still not present, the water utility shall be contacted to report the lack of residual chlorine in the building after extensive flushing. The required chlorine levels and any remedies shall be in accordance with the Authority Having Jurisdiction.
   e. Clean and replace aerators. Remove, clean, and replace showerheads. Check all fixtures for proper functionality.
   f. After flushing, ensure that the presence of residual chlorine has been verified at the fixtures farthest away from the incoming flow of water. Where residual chlorine is not verified, additional flushing of those fixtures shall be required.
Water cooler/fountain filters and aerators shall be cleaned.

Note: Any disruption of supply pressure that may have occurred while the building was shut down can dislodge particulates, including lead, which can get trapped in aerators and filters, spiking lead levels and reducing water quality.

**Q 405.5.4 Water Treatment Systems and Drinking Water Filters.** Where there are water treatment or filtration products used in the plumbing system, such systems shall be regenerated, flushed, or require filter replacement. The flushing and disinfection shall be done in accordance with the manufacturer's instructions.

Water lines shall be flushed, and the filters shall be cleaned leading to coffee makers, ice makers, dishwashers, clothes washing machines, and water fountains/coolers.

Note: Clean coffee makers and ice makers and run for a minimum of three cycles, discarding the water and ice. Contact the manufacturers of carbonated beverage machines and follow their flushing and disinfection instructions. In hair salons, special care should be taken to thoroughly flush and clean hand-held showerheads and hoses. All outdoor utilities and hose bibs should also be flushed.

**Q 405.6 Flushing Consideration-Various Plumbing Distribution Types.** Flushing procedures consideration when the building is vacant or partially shutdown (system is shutdown) for various premise plumbing system distribution types shall be in accordance with Section Q 405.6.1 and Section Q 405.6.2.

**Q 405.6.1 Horizontal Distribution Systems.** Horizontal distribution systems shall be flushed in accordance with the following:

1. Flush furthest ends of water system on ground floor.
2. Upon completion of first floor flush, continue flushing the furthest point on each floor to the highest floor.

**Q 405.6.2 Vertical Distribution Systems.** Flushing considerations for simple and complex vertical distribution systems shall be in accordance with Section Q 405.6.2.1 and Section Q 405.6.2.2.

**Q 405.6.2.1 Simple Vertical Distribution.** Simple vertical distribution systems shall be flushed in accordance with the following:

1. Flush furthest ends of water system on ground floor.
2. Upon completion of first floor flush, flushing the furthest point on the highest floor that is also the furthest horizontal distance from the mechanical room.

**Q 405.6.2.2 Complex Vertical Distribution.** Complex vertical distribution systems shall be flushed in accordance with the following:

1. Top Feed:
   a. Flush the furthest room and most hydraulically remote location on each lateral branch.
   b. Flush the furthest point on each vertical stack (not express main) on floors below distribution floor.
   c. Utilize programmable faucets with a flushing protocol available to assist.
2. Bottom Feed:
   a. Flush the furthest room and most hydraulically remote location on each lateral branch.
   b. Flush the furthest point on each vertical stack (not express main) on floors above distribution floor.
   c. Utilize programmable faucets with a flushing protocol available to assist.

SUBSTANTIATION:
The new section is being added to the UPC Appendix Q to address the safe closure and reopening of building water systems. Proposed Section Q 405.5 (Flushing Consideration), is in addition to Section Q 405.0 (Vacant or Partially Occupied Buildings), and addresses some of the additional considerations owners shall take to reduce the risk of health issues stemming from water distribution systems. This section also helps provide further considerations for various types of common distribution systems (although not all distribution system types) to give further detailed explanation.
Item #: 318

UPC 2024  Section: Q 406.0 – Q 406.3.3

SUBMITTER:  Gary Klein
Self
Chair, Potable Water Working Group

RECOMMENDATION:
Add new text

**Q 406.0 System Reopening.**
**Q 406.1 General.** System reopening shall be the set of actions taken to ready a building for normal operations after an extended period of no or limited operations. Systems that are being reopened after prolonged vacancy or partial vacancy shall comply with ASHRAE 188 and Section Q 406.0.

**Q 406.2 Testing.** The incoming water to the building shall be tested to determine disinfectant residual and waterborne pathogen (e.g., legionella) concentrations. The testing results shall be compared against baseline measurements.

**Q 406.3 Reopening Process.** The reopening process of the potable water supply systems shall be in accordance with Section Q 406.3.1 through Section Q 406.3.6.

**Q 406.3.1 Communication.** An occupancy date shall be determined and communicated to all building occupants. Clear communication for requirements of maintenance staff shall be provided. Clear instructions shall be provided to occupants for avoiding hazards and reporting concerns once the building is occupied.

**Q 406.3.2 Pre-Startup Inspection.** The following pre-startup inspection shall be done by a qualified person and shall include the following:
(1) Visually assessing the potable water system;
(2) Inspecting all components for the presence of contaminants and other adverse conditions;
(3) Checking that the equipment is working properly; and
(4) Ensuring that records are complete.

**Q 406.3.3 Disinfection.** New or repaired potable water systems shall be disinfected in accordance with Section 619.0. This procedure shall apply to the hot and cold-water piping systems and shall be performed 7 days prior to reopening. The water heater shall remain off.

SUBSTANTIATION:
The new section is being added to the UPC Appendix Q to address the safe reopening of building water systems after prolonged partial or full vacancy. The actions listed in the first part of Section Q 406.0 (System Reopening) are the general criteria that building owners are to take.
Q 406.3.4 Two Weeks of Reopening. The following testing protocol shall be done within two weeks of reopening:

Q 406.3.4.1 Daily Flushing. Implement flushing protocol as indicated in accordance with Section Q 405.2.1 or Section Q 405.2.2.

Q 406.3.4.2 Testing for Chlorine. Test at least 5 percent and not more than 20 randomly selected plumbing fixtures monthly for disinfectant residual. If residual reduces from baseline in accordance with Section Q 404.4.3, or is less than 0.2 ppm of chlorine or chloramine, the following actions shall be taken:

1. Contact the water utility to open the fire hydrant near building. This shall be completed prior to completing any flushing inside the building.
2. Retest water after this step to determine if disinfectant residual is present.
3. If disinfectant residual is still low after repeating the steps above, install a supplemental disinfection for the building potable water systems.

Q 406.3.4.3 Testing for Legionella. For buildings with populations that are susceptible to Legionella, at least 5 percent but no more than 20 randomly selected plumbing fixtures shall be tested daily for legionella. Where applicable, the following actions shall be taken:

1. Coordinate testing with laboratory to determine if expedited results can be provided. Considerations shall be made for utilizing rapid testing methods (qPCR) to supplement laboratory testing during this time.
2. Any further testing shall be dictated by time (extended beyond 2 weeks) or corrective actions. Fixtures that repeatedly test positively for legionella (greater than or equal to 1 CFU/mL) shall be flushed daily in accordance with the flushing protocol until opening. Testing shall be continued at these sites. Considerations shall be made for contacting a water treatment professional.
3. Where more than 30 percent of randomly selected sites continually test positive for Legionella (greater than or equal to 1 CFU/mL), a water treatment professional shall be contacted.

Note: Initial re-occupancy date may need to be rescheduled or certain areas of the building may need to have restricted access.

Q 406.3.5 Hot Water System Start-Up. Where applicable, the start-up of a water heater shall not be initiated until after the occupancy date has been confirmed and the cold and hot water disinfectant residual meets the requirements of Section Q 406.3.4.2 and Section Q 406.3.4.3. The water heater shall be turned on within one week prior to occupancy. The start-up of a water heater shall be completed in accordance with the following:

1. Recommission the hot water system. Verify the flow rates, temperatures, and hot water recirculation pumps are operating correctly.
2. The hot water system shall be rebalanced where necessary.
3. Confirm that all thermostatic mixing valves are operational and are not damaged/plugged.
4. Monitor supply and return water temperatures. The temperature shall be not less than 140°F (60°C) on the supply and 122°F (50°C) on the return. If the building owner is utilizing supplemental disinfection, the minimum supply and return temperatures shall be permitted to be lowered in accordance with the water treatment professional and/or water management team approval.

Q 406.3.6 Complete Reopening. Complete reopening shall be in accordance with the following:

1. Faucet aerators and shower heads that were removed during the shutdown process shall be reinstalled.
2. Confirm hot water delivery times at all hot water plumbing fixtures meet specifications throughout building.
SUBSTANTIATION:
The new section is being added to the UPC Appendix Q to address the safe reopening of building water systems after prolonged partial or full vacancy. The actions listed in the second part of Section Q 406.0 are the more specific criteria that building owners are to take within two weeks of reopening. This includes flushing and testing of water to verify that incoming and building water criteria meets minimum requirements and turning on and recommissioning the hot water system (if applicable).
Proposals

Item #: 320

UPC 2024  Section: Q 501.0 – Q 502.2, Table Q 502.2

SUBMITTER: Ramiro Mata
Self
Chair, Nonpotable Water Working Group

RECOMMENDATION:
Add new text

**Part III – Nonpotable Water Systems.**

**Q 501.0 Nonpotable Water Systems.**

**Q 501.1 General.** Section Q 501.0 through Section Q 504.0 shall apply to the continuous maintenance (normal operation), interruption to normal operation (system shutdown), and reopening of the nonpotable water system. For the purposes of Part III of this appendix, alternate water sources apply to nonpotable water applications. Closed systems shall be systems that are not open to atmosphere and do not require a supply or replenishment of water. Open systems shall be systems that are open to atmosphere or require a supply or replenishment of water.

**Q 502.0 Normal Operation.**

**Q 502.1 General.** Non-potable water shall include, but not be limited to, gray water, on-site treated nonpotable water, rainwater, process water and reclaimed water. Section Q 502.2 through Section Q 502.4 shall apply to alternate water source other than rainwater catchment system. Rainwater catchment systems shall comply with Section Q 502.5 through Section Q 502.5.5.

**Q 502.2 Equipment Inspection.** Equipment shall be checked for physical integrity and general function. Maintenance records shall be checked to confirm maintenance activities are up to date. Service contracts shall be checked to determine that regular service is being performed and that contractor recommendations are implemented. When maintenance is out of date, or specific issue is identified, the equipment shall be maintained in accordance with the manufacturer’s instructions or the registered design professional’s requirements. Where the manufacturer’s instructions do not provide inspection and maintenance frequency, the nonpotable water systems and components shall be inspected and maintained. The alternate water source testing, inspection and maintenance frequency shall be performed in accordance with Table Q 502.2.

**TABLE Q 502.2**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MINIMUM FREQUENCY-OPEN SYSTEM</th>
<th>MINIMUM FREQUENCY-CLOSED SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect and clean filters and screens, and replace (if necessary)</td>
<td>Monthly</td>
<td>Every 3 months</td>
</tr>
<tr>
<td>Inspect and verify that disinfection, filters and water quality treatment devices and systems are operational and maintaining minimum water quality requirements as determined by the Authority Having Jurisdiction</td>
<td>In accordance with manufacturer’s instructions, and the Authority Having Jurisdiction</td>
<td>In accordance with manufacturer’s instructions, and the Authority Having Jurisdiction</td>
</tr>
<tr>
<td>Inspect pumps and verify operation</td>
<td>After initial installation and every 3 months thereafter</td>
<td>After initial installation and every 12 months thereafter</td>
</tr>
<tr>
<td>Inspect valves and verify operation</td>
<td>After initial installation and every 3 months thereafter</td>
<td>After initial installation and every 12 months thereafter</td>
</tr>
<tr>
<td>Activity</td>
<td>Frequency</td>
<td>Timeframe</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Clear debris from and inspect storage tanks, locking devices, and verify operation</td>
<td>Monthly</td>
<td>After initial installation and every 12 months thereafter</td>
</tr>
<tr>
<td>Inspect caution labels and marking</td>
<td>After initial installation and every 12 months thereafter</td>
<td>After initial installation and every 12 months thereafter</td>
</tr>
<tr>
<td>Inspect and maintain mulch basins for gray water irrigation systems</td>
<td>As needed to maintain mulch depth and prevent ponding and runoff</td>
<td>As needed to maintain mulch depth and prevent ponding and runoff</td>
</tr>
<tr>
<td>Cross-connection inspection and test*</td>
<td>After initial installation and every 12 months thereafter</td>
<td>After initial installation and every 12 months thereafter</td>
</tr>
</tbody>
</table>

* The cross-connection test shall be performed in the presence of the Authority Having Jurisdiction in accordance with the requirements of this code.

**SUBSTANTIATION:**
With buildings are being shutdown, or in low use as a response to COVID-19, the need to establish minimum requirements for managing building water systems to mitigate health effects to building occupants has become critically important. Understandably, potable water systems are the primary focus in this effort. However, nonpotable water systems such as water features, cooling and produce sprays, and rainwater catchment systems, may also pose a significant risk to building occupants. Although there have been several published guidance to address building shutdowns, all are focused on the potable water system. This proposal is intended to be used by building owners and managers as a resource to safely operate and manage nonpotable water systems and by local jurisdictions as a tool to establish and enforce minimum requirements for nonpotable water systems during normal operation, building shutdowns and building re-openings. Except for the rainwater catchment system requirements which were derived from existing language in the UPC, requirements for nonpotable water systems were derived using potable water system requirements as a starting point.
Proposals

Item #: 321

UPC 2024  Section: Q 502.3 – Q 502.5.3, Table Q 502.5.3

SUBMITTER: Ramiro Mata
Self
Chair, Nonpotable Water Working Group

RECOMMENDATION:
Add new text

Q 502.3 Water Quality Monitoring. The maintenance procedures shall be followed to maintain the minimum water quality of the nonpotable water system. The minimum water quality for nonpotable water systems shall meet the applicable water quality requirements for the intended application as determined by the Authority Having Jurisdiction or the registered design professional's requirements as approved by the Authority Having Jurisdiction.

Water quality shall be checked at the following:
The most distant point in the nonpotable water distribution system
In areas that are known to be low or no-use
Before and after any water treatment and filtration system
Storage tanks or vessels

Q 502.4 Routine Flushing. The nonpotable water system shall be routinely flushed as required by the Authority Having Jurisdiction for bacterial control and to meet the water quality as stated in Section Q 504.1.2.

Q 502.5 Rainwater Catchment Systems. The rainwater catchment conveyance system shall be equipped with a debris excluder or other approved means to prevent the accumulation of leaves, needles, other debris, and sediment from entering the storage tank. Devices or methods used to remove debris or sediment shall be accessible and sized and installed in accordance with manufacturer's installation instructions.

Q 502.5.1 Water Treatment and Filtration Equipment. A filter permitting the passage of particulates not larger than 100 microns (100 µm) shall be provided for rainwater supplied to water closets, urinals, trap primers, and drip irrigation system. The water treatment and filtration shall be maintained in accordance with the manufacturer's installation instructions.

Q 502.5.2 Water Quality Monitoring. 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 Q 502.5.3.

Exception: No treatment is required for rainwater used for subsurface or non-sprinkled surface irrigation where the maximum storage volume is less than 360 gallons (1363 L).

Q 502.5.3 Minimum Water Quality. Where the water quality is not acceptable as required in Section Q 502.5.2, determine whether routine flushing is needed. Where completed, routine flushing shall be done in accordance with Section Q 502.5.5. Where the water quality of the tested water cannot consistently be maintained at the minimum levels specified in Table Q 502.5.3, the system shall be equipped with an appropriate treatment device meeting applicable NSF standards or equivalent.

Water quality shall be checked at the following locations:
(1) The most distant point in the rainwater catchment distribution system,
(2) In areas that are known to be low or no-use,
(3) Before and after any water treatment and filtration system, and
(4) Storage tanks or vessels.
### TABLE Q 502.5.3
**MINIMUM WATER QUALITY FOR RAINWATER CATCHMENT SYSTEMS**

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>MINIMUM TREATMENT</th>
<th>MINIMUM WATER QUALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car washing</td>
<td>Debris excluder or other approved means in accordance with Section Q 502.5, and 100 microns in accordance with Section Q 502.5.1 for drip irrigation.</td>
<td>N/A</td>
</tr>
<tr>
<td>Subsurface and drip irrigation</td>
<td>Debris excluder or other approved means in accordance with Section Q 502.5, and 100 microns in accordance with Section Q 502.5.1 for drip irrigation.</td>
<td>N/A</td>
</tr>
<tr>
<td>Spray irrigation where the maximum storage volume is less than 360 gallons</td>
<td>Debris excluder or other approved means in accordance with Section Q 502.5, and disinfection in accordance with Section Q 502.5.4.</td>
<td>N/A</td>
</tr>
<tr>
<td>Spray irrigation where the maximum storage volume is equal to or more than 360 gallons</td>
<td>Debris excluder or other approved means in accordance with Section Q 502.5.</td>
<td>Escherichia coli: &lt; 100 CFU/100 mL, and Turbidity: &lt; 10 NTU</td>
</tr>
<tr>
<td>Urinal and water closet flushing, clothes washing, and trap priming</td>
<td>Debris excluder or other approved means in accordance with Section Q 502.5, and 100 microns in accordance with Section Q 502.5.1.</td>
<td>Escherichia coli: &lt; 100 CFU/100 mL, and Turbidity: &lt; 10 NTU</td>
</tr>
<tr>
<td>Ornamental fountains and other water features</td>
<td>Debris excluder or other approved means in accordance with Section Q 502.5.</td>
<td>Escherichia coli: &lt; 100 CFU/100 mL, and Turbidity: &lt; 10 NTU</td>
</tr>
<tr>
<td>Cooling tower make-up water</td>
<td>Debris excluder or other approved means in accordance with Section Q 502.5, and 100 microns in accordance with Section Q 502.5.1.</td>
<td>Escherichia coli: &lt; 100 CFU/100 mL, and Turbidity: &lt; 10 NTU</td>
</tr>
</tbody>
</table>

For SI units: 1 micron = 1 µm, 1 gallon = 3.785 L

**Q 502.5.4 Water Quality Devices and Equipment.** Devices and equipment used to treat rainwater 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) and approved for the intended application.

**Q 502.5.5 Routine Flushing.** The rainwater catchment system shall be routinely flushed as required by the Authority Having Jurisdiction for bacterial control and to meet water quality in accordance with Table Q 502.5.3.

**SUBSTANTIATION:**

With buildings being shut down or in low use as a response to COVID-19, the need to establish minimum requirements for managing building water systems to mitigate health effects to building occupants has become critically important. Understandably, potable water systems are the primary focus in this effort. However, nonpotable water systems such as water features, cooling and produce sprays, and rainwater catchment systems, may also pose a significant risk to building occupants. Although there have been several published guidance to address building shutdowns, all are focused on the potable water system. This proposal is intended to be used by building owners and managers as a resource to safely operate and manage nonpotable water systems and by local jurisdictions as a tool to establish and enforce minimum requirements for nonpotable water systems during normal operation, building shutdowns and building reopenings. Except for the rainwater catchment system requirements which were derived from existing language in the UPC, requirements for nonpotable water systems were derived using potable water system requirements as a starting point.
Proposals

Item #: 322

UPC 2024  Section: Q 503.0 – Q 503.4.1, Table Q 503.1

SUBMITTER: Ramiro Mata
Self
Chair, Nonpotable Water Working Group

RECOMMENDATION:
Add new text

Q 503.0 Interruption to Normal Operation (System Shutdown Process).
Q 503.1 General. This section shall apply to the closure strategies of the building water system for nonpotable systems when the normal operation is interrupted. The required inspection prior to shutting down the nonpotable water system shall be in accordance with Table Q 503.1.

Note: These procedures are general guidelines intended to supplement the requirements set forth by the registered design professional and the Authority Having Jurisdiction.

Q 503.2 Without Draining (Except Rainwater Catchment Systems). When the nonpotable water system is shutdown without draining of the system, the following shall be done:
(1) Prior to system shutdown, verify operation of bypass system.
(2) Inspect bypass system and verify proper operation at a minimum of every three months.
(3) Where applicable, implement procedures to prevent pipes from freeze damage.
(4) Use proper lockout/tagout procedures and follow manufacturer’s instructions to remove stored energy from equipment.

Q 503.3 Shutting Down with System Draining. When the nonpotable water system is shutdown with draining of the system, the following shall be done:
(1) Shut off water supply and drain the tank.
(2) Drain the system following the manufacturer’s instructions, the water management program, and the registered design professional or the Authority Having Jurisdiction.
(3) Close supply valves to storage water tanks and drain the tanks until the water runs clear.
(4) Shutoff and drain the water supply system.

Note: Unless the system can be physically dried, it is likely that pockets of water and condensation will remain even after the system is drained. These remaining pockets of water may be sufficient to allow waterborne pathogens to grow, including Legionella.

Q 503.4 Rainwater Catchment Systems. Rainwater harvesting systems shall be maintained in accordance with ARCSA/ASPE 63 and in functioning order for the life of the system. Failure to properly maintain such a system shall require the owner to abandon the system. Refer to Section Q 502.5 for continuous maintenance procedures during normal operation.

Q 503.4.1 System Bypass. Rainwater harvesting systems shall be placed in bypass mode and not be completely shutdown, even while the primary water supply system is shutdown during low use or building closure.
### TABLE Q 503.1
REQUIRED INSPECTION PRIOR TO SYSTEM INTERRUPTION

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>Open System</th>
<th>Closed System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect and clean filters and screens, and replace (if necessary)</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Inspect and verify that disinfection, filters and water quality treatment devices and systems are operational and maintaining minimum water quality requirements as determined by the Authority Having Jurisdiction</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Inspect pumps and verify proper operation (for bypass systems)</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Inspect valves and verify proper operation</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Clear debris from and inspect storage tanks, locking devices, and verify operation</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Inspect caution labels and markings</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Inspect and maintain mulch basins for gray water irrigation systems</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Inspect flushing system and verify proper operation</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Cross-connection inspection and test*</td>
<td>☑</td>
<td>☑</td>
</tr>
</tbody>
</table>

* The cross-connection test shall be performed in the presence of the Authority Having Jurisdiction in accordance with the requirements of the plumbing code.

### SUBSTANTIATION:

With buildings being shutdown or in low use as a response to COVID-19, the need to establish minimum requirements for managing building water systems to mitigate health effects to building occupants has become critically important. Understandably, potable water systems are the primary focus in this effort. However, nonpotable water systems such as water features, cooling and produce sprays, and rainwater catchment systems, may also pose a significant risk to building occupants. Although there have been several published guidance to address building shutdowns, all are focused on the potable water system. This proposal is intended to be used by building owners and managers as a resource to safely operate and manage nonpotable water systems and by local jurisdictions as a tool to establish and enforce minimum requirements for nonpotable water systems during normal operation, building shutdowns and building reopenings. Except for the rainwater catchment system requirements which were derived from existing language in the UPC, requirements for nonpotable water systems were derived using potable water system requirements as a starting point.
Proposals

Item #: 323
UPC 2024 Section: Q 504.0 – Q 504.2.5

SUBMITTER: Ramiro Mata
Self
Chair, Nonpotable Water Working Group

RECOMMENDATION:
Add new text

Q 504.0 Reopening of Nonpotable Water Systems.
Q 504.1 General Systems. The reopening of nonpotable water systems shall be in accordance with Section Q 504.1.1 through Section Q 504.1.3. The reopening of the nonpotable rainwater systems shall be in accordance with Section Q 504.2 through Section Q 504.2.5.
Q 504.1.1 Equipment Inspections. Equipment shall be checked for physical integrity and general function. Equipment shall be inspected in accordance with the manufacturer’s start up procedures. The alternate water source testing, inspection and maintenance frequency shall be performed in accordance with Section Q 502.2.
Q 504.1.2 Water Quality Testing. The water quality shall be tested until it meets the minimum water quality parameters of the non-potable water system. The minimum water quality for non-potable water systems shall meet the applicable water quality requirements for the intended application as determined by the Authority Having Jurisdiction or the registered design professional’s requirements approved by the Authority Having Jurisdiction.
Water quality shall be checked at the following locations:
(1) The most distant point in the nonpotable water distribution system
(2) In areas that are known to be low or no-use
(3) Before and after any water treatment and filtration system
(4) Storage tanks or vessels.
Q 504.1.3 System Flushing. The nonpotable water system shall be flushed as required by the Authority Having Jurisdiction for bacterial control and to meet water quality in accordance with Section Q 504.1.2.
Q 504.2 Rainwater Catchment Systems. The rainwater catchment conveyance system shall be equipped with a debris excluder or other approved means to prevent the accumulation of leaves, needles, other debris and sediment from entering the storage tank. Devices or methods used to remove debris or sediment shall be accessible and sized and installed in accordance with manufacturer’s installation instructions.
Q 504.2.1 Water Treatment and Filtration Equipment. A filter permitting the passage of particulates not larger than 100 microns (100 µm) shall be provided for rainwater supplied to water closets, urinals, trap primers, and drip irrigation system. The water treatment and filtration shall be maintained in accordance with the manufacturer’s installation instructions.
Q 504.2.2 Water Quality Monitoring. 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 Q 502.5.3.
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).
Q 504.2.3 Minimum Water Quality. Where the water quality is not acceptable as required in Section Q 504.2.2, it shall be determined whether routine flushing is needed. Where completed, routine flushing shall be done in accordance with Section Q 504.2.5. Where the water quality of the tested water cannot consistently be maintained at the minimum levels specified in Table Q 502.5.3, then the system shall be equipped with an appropriate treatment device meeting applicable NSF standards or equivalent.
Water quality shall be checked in accordance with the following:
(1) At the most distant point in the rainwater catchment distribution system
(2) In areas that are known to be low or no-use
(3) Before and after any water treatment and filtration system, and
(4) Storage tanks or vessels.

**Q 504.2.4 Water Quality Devices and Equipment.** Devices and equipment used to treat rainwater 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) and approved for the intended application.

**Q 504.2.5 Routine Flushing.** The rainwater catchment system shall be routinely flushed as required by the Authority Having Jurisdiction for bacterial control and to meet water quality in accordance with Table Q 502.5.3.

**SUBSTANTIATION:**
With buildings being shutdown or in low use as a response to COVID-19, the need to establish minimum requirements for managing building water systems to mitigate health effects to building occupants has become critically important. Understandably, potable water systems are the primary focus in this effort. However, nonpotable water systems such as water features, cooling and produce sprays, and rainwater catchment systems, may also pose a significant risk to building occupants. Although there have been several published guidance to address building shutdowns, all are focused on the potable water system. This proposal is intended to be used by building owners and managers as a resource to safely operate and manage nonpotable water systems and by local jurisdictions as a tool to establish and enforce minimum requirements for nonpotable water systems during normal operation, building shutdowns and building reopenings. Except for the rainwater catchment system requirements which were derived from existing language in the UPC, requirements for nonpotable water systems were derived using potable water system requirements as a starting point.
APPENDIX R
TINY HOUSES

R 101.0 Tiny Houses.
R 101.1 Applicability. 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 provision 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 structure 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 plan 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 ³⁄₄ 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 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.

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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>NFPA 1194-2021</td>
<td>Standard for Recreational Vehicle Parks and Campgrounds</td>
<td>Recreational Vehicles</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

**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.
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 301.2 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 by a person registered or licensed to perform plumbing design work or who demonstrates competency to design composting toilet and urine diversion systems.

S 301.4 Permit. It shall be unlawful for any person to construct, install, alter, or cause to be constructed, installed, or altered any composting toilet and urine diversion system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.

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 401.6 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 401.0 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 Commodes.
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/ft\(^2\)) (1465 kg/m\(^2\)) 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, or
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.
Vent stacks terminate at exterior of the building as required by the plumbing or mechanical code.
The compost processor is sized in accordance with the approved design.

Leachate Storage Tanks
Leachate storage tanks, where provided, shall be constructed of polyethylene terephthalate (PET), polyethylene 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.
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.
Where storage tank overflows are installed they shall be connected to the plumbing drainage system.
All leachate storage tanks shall have a high-water alarm. The alarm shall report when 80 percent volume is reached.
Storage tank overflows shall be provided with a backwater valve or check valve at the point of connection to the plumbing drainage system when connected to a public sewer system. The backwater valve shall be accessible for inspections and maintenance.

Urine Storage Tanks
Below grade urine storage tanks shall be in accordance with the approved design.
Above grade storage urine storage tanks are constructed of polyethylene terephthalate (PET), polyethylene 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 have a backwater valve or check valve at the point of connection to the plumbing drainage system when connected to a public sewer system. The backwater valve is accessible for inspections and maintenance.
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.

**TABLE 1701.2**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 CFR 178.274</td>
<td>Specifications for UN portable tanks</td>
<td>Miscellaneous</td>
</tr>
<tr>
<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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</tbody>
</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.
Proposals

Item #: 326
UPC 2024 Section: Table 1701.1

SUBMITTER: Gretchen Pienta
ARCSA/ASPE

RECOMMENDATION:
Revise text

TABLE 1701.1
REFERRED STANDARDS

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<td>ARCSA/ASPE 63-2013-2020</td>
<td>Rainwater Catchment Systems</td>
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</tr>
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(portions of table not shown remains unchanged)

Note: ARCSA/ASPE 63 meets the requirements for mandatory referenced standards 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 ARCSA/ASPE standard that is referenced in Table 1701.1.
Proposals

Item #: 327

UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: Carlton Ramcharran/Angel Guzman
ASME

RECOMMENDATION:
Revise text

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<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASME A112.1.3-2000 (R2016)-(R2019)</td>
<td>Air Gap Fittings for Use with Plumbing Fixtures, Appliances, and Appurtenances</td>
<td>Fittings</td>
<td>Table 603.2</td>
</tr>
<tr>
<td>ASME A112.4.2-2015/CSA B45.16-2015 (R2020)</td>
<td>Personal Hygiene Devices for Water Closets</td>
<td>Fixtures</td>
<td>411.4</td>
</tr>
<tr>
<td>ASME A112.6.3-2016 2019</td>
<td>Floor and Trench Drains</td>
<td>Fixtures</td>
<td>418.1</td>
</tr>
<tr>
<td>ASME A112.6.7-2010 (R2016) (R2019)</td>
<td>Sanitary Floor Sinks</td>
<td>Fixtures</td>
<td>421.1</td>
</tr>
<tr>
<td>ASME A112.6.9-2005 (R2014) (R2019)</td>
<td>Siphonic Roof Drains</td>
<td>DWV Components</td>
<td>1106.3</td>
</tr>
<tr>
<td>ASME A112.14.6-2010 (R2016) (R2019)</td>
<td>FOG (Fats, Oils, and Greases) Disposal Systems</td>
<td>Fixtures</td>
<td>1015.2</td>
</tr>
<tr>
<td>ASME A112.18.2-2045 2020/CSA B125.2-2015 2020</td>
<td>Plumbing Waste Fittings</td>
<td>Fittings</td>
<td>404.1</td>
</tr>
<tr>
<td>ASME B1.20.1-2013 (R2018)</td>
<td>Pipe Threads, General Purpose; (Inch)</td>
<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>ASME B16.12-2009 (R2014)+2019</td>
<td>Cast Iron Threaded Drainage Fittings</td>
<td>Fittings</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASME B31.3-2016-2018</td>
<td>Process Piping</td>
<td>Piping</td>
<td>1308.2(9)</td>
</tr>
<tr>
<td>ASME BPVC Section VIII.1-2047-2019</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>
</tr>
<tr>
<td>ASME BPVC Section IX-</td>
<td>Welding, Brazing, and Fusing Qualifications</td>
<td>Miscellaneous</td>
<td>1322.1.1,</td>
</tr>
</tbody>
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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**

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
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<tbody>
<tr>
<td>ASME A13.1-2019</td>
<td>Scheme for the Identification of Piping Systems</td>
<td>Piping</td>
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<tr>
<td>ASME B31.1-2018</td>
<td>Power Piping</td>
<td>Piping</td>
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<tr>
<td>ASME BPVC Section IV-2015-2019</td>
<td>Rules for Construction of Heating Boilers</td>
<td>Miscellaneous</td>
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(/portions of table not shown remains 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 #: 328
UPC 2024  Section: Table 1701.1

SUBMITTER: Gretchen Pienta  
ASPE

RECOMMENDATION: 
Revise text

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<tr>
<td>ASPE 45-2049-2018</td>
<td>Siphonic Roof Drainage</td>
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(portions of table not shown remains unchanged)

Note: ASPE 45 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 edition to the ASPE standard that is referenced in Table 1701.1.
Proposals

Item #: 329
UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: Terry Burger
ASSE

RECOMMENDATION:
Revise text

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<th>STANDARD NUMBER</th>
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<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<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 1003-2009-2020</td>
<td>Water Pressure Reducing Valves for Domestic-Potable Water Distribution Systems</td>
<td>Valves</td>
<td>608.2</td>
</tr>
<tr>
<td>ASSE 1008-2006-2020</td>
<td>Plumbing Aspects of Residential Food Waste Disposer Units</td>
<td>Appliances</td>
<td>419.1</td>
</tr>
<tr>
<td>ASSE 1020-2004-2020</td>
<td>Pressure Vacuum Breaker Assembly Assemblies</td>
<td>Backflow Protection</td>
<td>Table 603.2</td>
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<tr>
<td>ASSE 1022-2017-2021</td>
<td>Backflow Preventer for Beverage Dispensing Equipment</td>
<td>Backflow Protection</td>
<td>Table 603.2, 603.5.12</td>
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<tr>
<td>ASSE 1023-1979-2020</td>
<td>Hot Water Dispensers Household Storage Type – Electrical Electrically Heated or Cooled Water Dispensers</td>
<td>Appliances</td>
<td>417.6</td>
</tr>
<tr>
<td>ASSE 1035-2008-2020</td>
<td>Laboratory Faucet Backflow Preventers</td>
<td>Backflow Protection</td>
<td>Table 603.2, 603.3.11</td>
</tr>
<tr>
<td>ASSE 1044-2015 (R2020)</td>
<td>Trap Seal Primer - Drainage Types and Electric Design Types</td>
<td>DWV Components</td>
<td>1007.2</td>
</tr>
<tr>
<td>ASSE 1053-2004-2019</td>
<td>Dual Check Backflow Preventer Wall Hydrants – Freeze Resistant Type</td>
<td>Backflow Protection</td>
<td>Table 603.2</td>
</tr>
<tr>
<td>ASSE IAPMO 1055-2018-2020</td>
<td>Chemical Dispensing Systems Dispensers with Integral Backflow Protection</td>
<td>Backflow Protection</td>
<td>603.5.21</td>
</tr>
<tr>
<td>ASSE 1056-2013 (R2021)</td>
<td>Spill Resistant Vacuum Breaker Assemblies</td>
<td>Backflow Protection</td>
<td>Table 603.2</td>
</tr>
<tr>
<td>ASSE 1061-2015-2020</td>
<td>Push-Fit Fittings</td>
<td>Fittings</td>
<td>Table 604.1, 605.1.3.3, 605.2.1.1, 605.3.2.1, 605.9.3</td>
</tr>
<tr>
<td>ASSE 1064-2006 (R2011)-2020</td>
<td>Performance Requirements for Backflow Prevention Assembly Field</td>
<td>Backflow Protection</td>
<td>603.4.2</td>
</tr>
<tr>
<td>DOCUMENT NUMBER</td>
<td>Document Title</td>
<td>APPLICATION</td>
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</tr>
<tr>
<td>-----------------</td>
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<tr>
<td>ASSE 1032-2004</td>
<td>Dual Check Valve Type Backflow Preventers for Carbonated Beverage Dispensers, Post Mix Type</td>
<td>Backflow Protection</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.

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>ASSE 1069-2005-2020</td>
<td>Automatic Temperature Control Mixing Valves</td>
<td>Valves 408.3.1, 408.3.2(2)</td>
</tr>
<tr>
<td>ASSE 1071-2012 (R2021)</td>
<td>Temperature Actuated Mixing Valves for Plumbed Emergency Equipment</td>
<td>Valves 416.2</td>
</tr>
<tr>
<td>ASSE 1079-2012 (R2021)</td>
<td>Dielectric Pipe Unions</td>
<td>Fittings 605.15, 605.16.1, 605.16.3</td>
</tr>
<tr>
<td>ASSE 1081-2014 (R2020)</td>
<td>Backflow Preventers with Integral Pressure Reducing Boiler Feed Valve and Intermediate Atmospheric Vent Style for Domestic and Light Commercial Water Distribution Systems</td>
<td>Backflow Protection Table 603.2</td>
</tr>
<tr>
<td>ASSE 1084-2018</td>
<td>Water Heaters with Temperature Limiting Capacity</td>
<td>Appliances 407.3(2), 408.3.2(4), 409.4(2), 410.3(2)</td>
</tr>
<tr>
<td>ASSE 6020-2015-2018</td>
<td>Medical Gas Systems Inspectors</td>
<td>Miscellaneous 1324.5.4.7, 1324.5.6.2, 1324.5.6.5</td>
</tr>
<tr>
<td>ASSE 6030-2015-2018</td>
<td>Medical Gas Systems Verifiers</td>
<td>Miscellaneous 1324.5.7.2</td>
</tr>
<tr>
<td>ASSE 6035-2015-2018</td>
<td>Bulk Medical Gas/Cryogenic Fluid Central Supply Systems Verifiers</td>
<td>Miscellaneous 1324.5.7.3</td>
</tr>
<tr>
<td>ASSE/IAPMO/ANSI Series 7000-2013-2020</td>
<td>Residential Potable Water Fire Protection Sprinkler System Installers &amp; Inspectors for One- and Two-Family Dwellings</td>
<td>Miscellaneous 612.1</td>
</tr>
<tr>
<td>ASSE/IAPMO/ANSI 12010-2018</td>
<td>Biological Pathogens Professional Qualifications Standard for Construction and Maintenance Personnel</td>
<td>Professional Qualifications 1303.9</td>
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<tr>
<td>ASSE/IAPMO 12030-2018</td>
<td>Waterborne Pathogens Professional Qualifications Standard for Construction and Maintenance Personnel (WITHDRAWN)</td>
<td>Professional Qualifications 1303.9</td>
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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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<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<tr>
<td>ASTM A53/A53M-2018</td>
<td>Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless</td>
<td>Piping</td>
<td>Table 604.1, Table 701.2, 1208.6.3.1(1)</td>
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<tr>
<td>ASTM A74-2018</td>
<td>Cast Iron Soil Pipe and Fittings</td>
<td>Piping</td>
<td>301.2.4, Table 701.2</td>
</tr>
<tr>
<td>ASTM A106/A106M-2018</td>
<td>Seamless Carbon Steel Pipe for High-Temperature Service</td>
<td>Piping</td>
<td>1208.6.3.1(2)</td>
</tr>
<tr>
<td>ASTM A254/A254M-2012</td>
<td>Copper-Brazed Steel Tubing</td>
<td>Piping</td>
<td>1208.6.4.2</td>
</tr>
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<td>ASTM A268/A268M-2010</td>
<td>Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service</td>
<td>Piping</td>
<td>1208.6.4.1(1)</td>
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<td>ASTM A269/A269M-2015</td>
<td>Seamless and Welded Austenitic Stainless Steel Tubing for General Service</td>
<td>Piping</td>
<td>Table 604.1, 1208.6.4.1(2), 1319.1(2)(a), 1319.1(2)(b), 1319.1(2)(c)</td>
</tr>
<tr>
<td>ASTM A312/A312M-2019</td>
<td>Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes</td>
<td>Piping</td>
<td>Table 604.1, 1208.6.3.1(3), 1319.1(2)(b), 1319.1(2)(c)</td>
</tr>
<tr>
<td>ASTM A403/A403M-2018</td>
<td>Wrought Austenitic Stainless Steel Piping Fittings</td>
<td>Fittings</td>
<td>1319.1(2)(c)</td>
</tr>
<tr>
<td>ASTM A888-2018</td>
<td>Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications</td>
<td>Piping</td>
<td>301.2.4, Table 701.2, Table 707.2</td>
</tr>
<tr>
<td>ASTM A1056-2017</td>
<td>Cast Iron Couplings used for Joining Hubless Cast Iron Soil Pipe and Fittings</td>
<td>Fittings</td>
<td>705.2.2</td>
</tr>
<tr>
<td>ASTM B42-2015</td>
<td>Seamless Copper Pipe, Standard Sizes</td>
<td>Piping</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>ASTM B43-2015</td>
<td>Seamless Red Brass Pipe, Standard Sizes</td>
<td>Piping</td>
<td>Table 604.1, Table 701.2</td>
</tr>
<tr>
<td>ASTM B75/B75M-2014</td>
<td>Seamless Copper Tube</td>
<td>Piping</td>
<td>Table 604.1, Table 701.2</td>
</tr>
<tr>
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<td>Title</td>
<td>Section(s)</td>
<td>Table(s)</td>
</tr>
<tr>
<td>-----------------</td>
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<td>ASTM B88-2016-2020</td>
<td>Seamless Copper Water Tube</td>
<td>Piping</td>
<td>Table 604.1, 604.4, 903.2.3, 1208.6.4.3, 1319.1(1)(a)</td>
</tr>
<tr>
<td>ASTM B152/B152M-2013-2019</td>
<td>Copper Sheet, Strip, Plate, and Rolled Bar</td>
<td>Miscellaneous</td>
<td>408.7.4</td>
</tr>
<tr>
<td>ASTM B210/B210M-2012-2019</td>
<td>Aluminum and Aluminum-Alloy Drawn Seamless Tubes</td>
<td>Piping</td>
<td>1208.6.4.4</td>
</tr>
<tr>
<td>ASTM B280-2018-2020</td>
<td>Seamless Copper Tube for Air Conditioning and Refrigeration Field Service</td>
<td>Piping</td>
<td>1208.6.4.3, 1319.1(1)(b)</td>
</tr>
<tr>
<td>ASTM B306-2013-2020</td>
<td>Copper Drainage Tube (DWV)</td>
<td>Piping</td>
<td>Table 701.2, 903.2.3</td>
</tr>
<tr>
<td>ASTM B819-2018-2019</td>
<td>Seamless Copper Tube for Medical Gas Systems</td>
<td>Piping</td>
<td>1318.4, 1318.5, 1319.1(1)(c), 1319.1.1</td>
</tr>
<tr>
<td>ASTM C564-2014-2020a</td>
<td>Rubber Gaskets for Cast Iron Soil Pipe and Fittings</td>
<td>Joints</td>
<td>705.2.2</td>
</tr>
<tr>
<td>ASTM C1277-2018-2020</td>
<td>Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings</td>
<td>Fixtures</td>
<td>301.2.4, 705.2.2</td>
</tr>
<tr>
<td>ASTM C1540-2018-2020</td>
<td>Heavy-Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings</td>
<td>Joints</td>
<td>705.2.2</td>
</tr>
<tr>
<td>ASTM D2241-2015-2020</td>
<td>Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)</td>
<td>Piping</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>ASTM D2467-2015-2020</td>
<td>Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>ASTM D2513-2018-2019a</td>
<td>Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings</td>
<td>Piping</td>
<td>1208.6.5, 1208.6.7.2, 1208.6.11.2, 1210.1.7.1(1)</td>
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<td>ASTM D2665-2014-2020</td>
<td>Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings</td>
<td>Piping</td>
<td>Table 701.2, Table 707.2</td>
</tr>
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<td>ASTM D2680-2004(R2014)-2020</td>
<td>Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping</td>
<td>Piping</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM D2846/D2846M-2019a</td>
<td>Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems</td>
<td>Piping</td>
<td>Table 604.1, 605.2.2, 605.3.1</td>
</tr>
<tr>
<td>ASTM E84-2018b-2020</td>
<td>Surface Burning Characteristics of Building Materials</td>
<td>Miscellaneous</td>
<td>701.2(2), 903.1(2), 1101.4</td>
</tr>
<tr>
<td>ASTM F439-2013-2019</td>
<td>Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>ASTM F441/F441M-2016-2020</td>
<td>Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80</td>
<td>Piping</td>
<td>Table 604.1</td>
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<tr>
<td>ASTM F442/F442M-2013-2020</td>
<td>Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)</td>
<td>Piping</td>
<td>Table 604.1, 605.2.2</td>
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<tr>
<td>ASTM F493-2014-2020</td>
<td>Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings</td>
<td>Joints</td>
<td>605.2.2, 605.3.1</td>
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<td>Standard</td>
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<td>ASTM F714-2014-2021</td>
<td>Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter</td>
<td>Piping</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM F876-2017-2020</td>
<td>Crosslinked Polyethylene (PEX) Tubing</td>
<td>Piping</td>
<td>Table 604.1, 605.9.1</td>
</tr>
<tr>
<td>ASTM F877-2018a 2020</td>
<td>Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems</td>
<td>Piping</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>ASTM F894-2019-2019</td>
<td>Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe</td>
<td>Piping, Plastic</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM F1760-2016 (R2020)</td>
<td>Coextruded Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed Recycled Content</td>
<td>Piping</td>
<td>Table 701.2</td>
</tr>
<tr>
<td>ASTM F1807-2019a 2019b</td>
<td>Metal Insert Fittings Utilizing a Copper Crimp Ring, or Alternate Stainless Steel Clamps, 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 F1960-2019a 2019a</td>
<td>Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) and Polyethylene of Raised Temperature (PE-RT) Tubing</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>ASTM F1970-2019a 2019</td>
<td>Special Engineered Fittings, Appurtenances or Valves for Use in Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Systems</td>
<td>Piping</td>
<td>Table 604.1, 606.1</td>
</tr>
<tr>
<td>ASTM F1974-2009 (R2016)-(R2020)</td>
<td>Metal Insert Fittings for Polyethylene/Aluminum/Polyethylene and Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene Composite Pressure Pipe</td>
<td>Fittings</td>
<td>Table 604.1, 605.7.1, 605.10.1</td>
</tr>
<tr>
<td>ASTM F1986-2001 (R2011)</td>
<td>Multilayer Pipe Type-2, Compression Fittings, and Compression Joints for Hot and Cold Drinking Water Systems (Withdrawn)</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>ASTM F2080-2018 2019</td>
<td>Cold-Expansion Fittings with Metal Compression-Sleeves for Crosslinked Polyethylene (PEX) Pipe and SDR9 Polyethylene of Raised Temperature (PE-RT) Pipe</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>ASTM F2098-2018-2018</td>
<td>Stainless Steel Clamps for Securing SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) to Metal Insert and Plastic Insert Fittings</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>ASTM F2159-2019a 2019a</td>
<td>Plastic Insert Fittings Utilizing a Copper Crimp Ring, or Alternate Stainless Steel Clamps, 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 F2389-2017a 2019</td>
<td>Pressure-Rated Polypropylene (PP) Piping Systems</td>
<td>Piping</td>
<td>Table 604.1, 605.11.1, 606.1</td>
</tr>
<tr>
<td>ASTM F2434-2018 2019</td>
<td>Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene (PEX-AL-PEX) Tubing</td>
<td>Fittings</td>
<td>Table 604.1, 605.10.1</td>
</tr>
<tr>
<td>ASTM F2561-2017-2020</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>
<td>715.3</td>
</tr>
<tr>
<td>ASTM F2599-2016 2020</td>
<td>The-Sectional Repair of Damaged Pipe by Means of an Inverted Cured-In-Place Liner</td>
<td>Piping</td>
<td>715.3</td>
</tr>
<tr>
<td>ASTM F2620-2019a 2019</td>
<td>Heat Fusion Joining of Polyethylene Pipe and Fittings</td>
<td>Joints</td>
<td>605.6.1.1, 605.6.1.3, 705.5.1.1, 705.5.1.3</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>(R2014)-(R2019)</td>
<td></td>
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<tr>
<td>ASTM A479/A479M-</td>
<td>Stainless Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels</td>
<td>Piping, Ferrous</td>
</tr>
<tr>
<td>2018-2020</td>
<td></td>
<td></td>
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<tr>
<td>ASTM A536-1984</td>
<td>Ductile Iron Castings</td>
<td>Piping, Ferrous</td>
</tr>
<tr>
<td>(R2014)-(R2019)e1</td>
<td></td>
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<tr>
<td>ASTM B29-2014-2019</td>
<td>Refined Lead</td>
<td>Joints</td>
</tr>
<tr>
<td>ASTM B370-2012</td>
<td>Copper Sheet and Strip for Building Construction</td>
<td>Miscellaneous</td>
</tr>
<tr>
<td>(R2019)</td>
<td></td>
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<tr>
<td>ASTM C14-2015a-2020</td>
<td>Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe</td>
<td>Piping, Non-Metallic</td>
</tr>
<tr>
<td>ASTM C412-2015-2019</td>
<td>Concrete Drain Tile</td>
<td>Piping, Non-Metallic</td>
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<tr>
<td>ASTM C443-2014-2020</td>
<td>Joints for Concrete Pipe and Manholes, Using Rubber Gaskets</td>
<td>Joints</td>
</tr>
<tr>
<td>ASTM C478/C478M-</td>
<td>Circular Precast Reinforced Concrete Manhole Sections</td>
<td>Miscellaneous</td>
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<td>2014-2020</td>
<td></td>
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<tr>
<td>ASTM C1227-2013</td>
<td>Precast Concrete Septic Tanks</td>
<td>DWV Components</td>
</tr>
<tr>
<td>2020</td>
<td></td>
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<tr>
<td>ASTM D2774-2014-2020</td>
<td>Underground Installation of Thermoplastic Pressure Piping</td>
<td>Piping, Plastic</td>
</tr>
<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>
<td>Joints</td>
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<tr>
<td>ASTM F1476-2007</td>
<td>Performance of Gasketed Mechanical Couplings for Use in Piping Applications</td>
<td>Joints</td>
</tr>
<tr>
<td>(R2013)-(R2019)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASTM F1924-2012-2019</td>
<td>Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing</td>
<td>Fittings</td>
</tr>
<tr>
<td>ASTM F1948-2015-2020</td>
<td>Metallic Mechanical Fittings for Use on Outside Diameter Controlled Thermoplastic Gas Distribution Pipe and Tubing</td>
<td>Fittings</td>
</tr>
<tr>
<td>ASTM F2206-2014-2019</td>
<td>Fabricated Fittings of Butt-Fused Polyethylene (PE)</td>
<td>DWV Components</td>
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</tbody>
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(portions of table not shown remains 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.
| ASTM F2306/F2306M-2018-2020 | 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 | Piping, Plastic |

(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.
Proposals

Item #: 331
UPC 2024  Section: Table 1701.1

SUBMITTER: Peter Portela
AWS

RECOMMENDATION:
Revise text

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<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<tr>
<td>AWS A5.8M/A5.8-2011-AMD 1-2019</td>
<td>Filler Metals for Brazing and Braze Welding</td>
<td>Joints</td>
<td>1211.4(1)</td>
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</tbody>
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(portions of table not shown remains unchanged)

Note: AWS A5.8M/A5.8 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 AWS standard that is referenced in Table 1701.1.
Proposals

Item #: 332

UPC 2024  Section: Table 1701.1

SUBMITTER: Paul Olson
AWWA

RECOMMENDATION:
Revise text

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<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
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<tbody>
<tr>
<td>AWWA C153-2011-2019</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 C507-2015-2018</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.
Proposals

Item #: 333
UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: Tom Deary
CGA (Compressed Gas Association)

RECOMMENDATION:
Revise text

TABLE 1701.1
REFERENCED STANDARDS

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<thead>
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<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
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<tr>
<td>CGA V-5-2008 (R2013)-2019</td>
<td>Diameter Index Safety System (Noninterchangeable Low Pressure Connections for Medical Gas Applications)</td>
<td>Connections</td>
<td>1315.5</td>
</tr>
</tbody>
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(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 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>CGA C-9-2013-2019</td>
<td>Standard Color Marking of Compressed Gas Containers for Medical Use</td>
<td>Miscellaneous</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>
<td>Fuel Gas</td>
</tr>
<tr>
<td>CGA V-1-2013-2019</td>
<td>Compressed Gas Cylinder Valve Outlet and Inlet Connections</td>
<td>Valves</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.
Proposals

Item #: 334

UPC 2024  Section: Table 1701.1

SUBMITTER: David Parney
CISPI

RECOMMENDATION:
Revise text

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>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>
</tr>
</tbody>
</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.
**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>ASME A112.18.2-2015-2020/CSA B125.2-2016-2020</td>
<td>Plumbing Waste Fittings</td>
<td>Fittings</td>
<td>404.1</td>
</tr>
<tr>
<td>ASME A112.19.7-2012-2020/CSA B45.10-2012 (R2017)-2020</td>
<td>Hydromassage Bathtub Systems</td>
<td>Fixtures</td>
<td>409.1, 409.6</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>CSA B45.12-2013 (R2018)/IAPMO Z402-2013 (R2018)</td>
<td>Aluminum and Copper Plumbing Fixtures</td>
<td>Fixtures</td>
<td>407.1, 408.1, 409.1, 420.1</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>
</tr>
<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>
</tr>
<tr>
<td>DOCUMENT NUMBER</td>
<td>DOCUMENT TITLE</td>
<td>APPLICATION</td>
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<tr>
<td>CSA B137.18-2017-2020</td>
<td>Polyethylene of Raised Temperature Resistance (PE-RT) Tubing Systems for Pressure Applications</td>
<td>Piping, Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>CSA/ANSI Z21.10.3-2017-2019/CSA 4.3-2019</td>
<td>Gas-Fired Water Heaters, Volume III, Storage Water Heaters with Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous (same as CSA 4.3)</td>
<td>Fuel Gas, Appliances</td>
<td>Table 501.1(1)</td>
</tr>
<tr>
<td>CSA/ANSI Z21.54-2014-2019/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>
<td>1212.3.2</td>
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(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.
|---|---|---|

(portions of table not shown remains 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 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>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 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 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>EPA/600/R-12/618-2012</td>
<td>Guidelines for Water Reuse</td>
<td>Miscellaneous</td>
</tr>
<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>
</tr>
</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.
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 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>
</tr>
<tr>
<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>
</tr>
<tr>
<td>IAPMO PS 65-20022019a</td>
<td>Airgap Units for Water Conditioning Equipment Installation</td>
<td>Backflow Protection</td>
<td>611.2</td>
</tr>
<tr>
<td>IAPMO PS 117-2014-2019</td>
<td>Press and Nail Connections</td>
<td>Fittings</td>
<td>Table 604.1</td>
</tr>
<tr>
<td>IAPMO Z124.5-2013</td>
<td>Plastic Toilet Seats</td>
<td>Appurtenance</td>
<td>411.3</td>
</tr>
<tr>
<td>IAPMO Z1033-2015</td>
<td>Flexible PVC Hoses and Tubing for Pools, Hot Tubs, Spas, and Jetted Bathubs</td>
<td>Tubing</td>
<td>409.6.1</td>
</tr>
<tr>
<td>IAPMO Z1088-2013-2019</td>
<td>Pre-Pressurized Water Expansion Tanks</td>
<td>Miscellaneous</td>
<td>608.3</td>
</tr>
<tr>
<td>IAPMO Z1157-2014</td>
<td>Ball Valves</td>
<td>Valves</td>
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(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.
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<tr>
<td>IAPMO IGC 109-2017 2019</td>
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<td>Valves</td>
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<td>IAPMO IGC 226-2017 2019</td>
<td>Drinking Water Fountains with or Without Chiller or Heater</td>
<td>Fixtures</td>
</tr>
<tr>
<td>IAPMO IGC 276-2017 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>
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<td>IAPMO PS 1-2007 2019</td>
<td>Tank Risers</td>
<td>DWV Components</td>
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<td>IAPMO PS 23-2014 2019</td>
<td>Dishwasher Drain Airgaps</td>
<td>Backflow Protection</td>
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<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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<td>IAPMO PS 34-2013-2019</td>
<td>Encasement Sleeves for Potable Water Pipe and Tubing</td>
<td>Piping</td>
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<tr>
<td>IAPMO PS 37-1999-2019</td>
<td>Black Plastic PVC or PE Pressure-Sensitive Corrosion Preventive Tape</td>
<td>Miscellaneous</td>
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<td>IAPMO PS 50-2010-2019</td>
<td>Flush Valves with Dual Flush Device for Water Closets or Water Closet Tanks with an Integral Flush Valves with a Dual Flush Device</td>
<td>Fixtures</td>
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<tr>
<td>IAPMO PS 52-2009-2019</td>
<td>Pump/Dose, Sumps and Sewage Ejector Tanks with or without a Pump</td>
<td>DWV Components</td>
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<tr>
<td>IAPMO PS 53-2016a 2020</td>
<td>Grooved Mechanical Pipe Couplings and Grooved Fittings</td>
<td>Joints</td>
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<tr>
<td>IAPMO PS 57-2002 2019</td>
<td>PVC Hydraulically Actuated Diaphragm Type Water Control Valves (Withdrawn)</td>
<td>Valves</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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<tr>
<td>IAPMO PS 67-2019-2019</td>
<td>Early-Closure Replacement Flappers or Early-Closure Replacement Flapper with Mechanical Assemblies</td>
<td>Fixtures</td>
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<tr>
<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 72-2007-2019</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>
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<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>IAPMO PS 82-1995 2000</td>
<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>
<td>Miscellaneous</td>
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<td>IAPMO PS 86-1995-2019</td>
<td>Rainwater Diverter Valves for Non-Roofed Area Slabs</td>
<td>DWV Components</td>
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<td>IAPMO PS 89-1995 2000</td>
<td>Soaking and Hydrotherapy (Whirlpool) Bathtubs with Hydraulic Seatlift (Withdrawn)</td>
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<td>IAPMO PS 95-2010-2019</td>
<td>Pipe Support Hangers and Hooks</td>
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<td>IAPMO PS 98-1996 2006</td>
<td>Prefabricated Fiberglass Church Baptisteries (Withdrawn)</td>
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<td>IAPMO PS 100-1996 2008</td>
<td>Porous Filter Protector for Sub-Drain Weep Holes (Withdrawn)</td>
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<td>Suction Relief Valves</td>
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<td>IAPMO PS 104-1997</td>
<td>Pressure Relief Connection for Dispensing Equipment</td>
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<td>IAPMO PS 105-1997</td>
<td>Polyethylene-Distribution Boxes (Withdrawn)</td>
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<td>IAPMO PS 110-2006a</td>
<td>PVC Cold Water Compression Fittings</td>
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<td>IAPMO PS 111-1999</td>
<td>PVC Cold Water Gripper Fittings</td>
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<td>IAPMO PS 112-1999</td>
<td>PVC Plastic Valves for Cold Water Distribution Systems</td>
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<td>Outside a Building and CPVC Plastic Valves for Hot and Cold Water Distribution Systems</td>
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<td>IAPMO PS 113-2010</td>
<td>Hydraulically Powered Household Food Waste Disposers (Withdrawn)</td>
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<td>IAPMO PS 114-1999</td>
<td>Remote Floor Box Industrial Water Supply, Air Supply, Drainage (Withdrawn)</td>
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<td>IAPMO PS 115-2007</td>
<td>Hot Water On-Demand or Automatic Activated Hot Water Pumping Systems</td>
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<td>IAPMO PS 116-1999</td>
<td>Hot Water Circulating Devices Which Do Not Use a Pump (Withdrawn)</td>
<td>Miscellaneous</td>
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<td>IAPMO Z124.7-2013</td>
<td>Prefabricated Plastic Spa Shells</td>
<td>Fixtures, Swimming Pools, Spas, and Hot Tubs</td>
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<td>IAPMO Z124.8-2013</td>
<td>Plastic Liners for Bathtubs and Shower Receptors</td>
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<td>Prefabricated Septic Tanks</td>
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**SUBSTANTIATION:**
The above revisions reflect the latest updates to the IAPMO standards that are referenced in Table 1701.1 and Table 1701.2.
Proposals

Item #: 338

UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: Kaley Garubba
Manufacturers Standardization Society (MSS)

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>MSS SP-80-2013</td>
<td>Bronze Gate, Globe, Angle, and Check Valves</td>
<td>Valves</td>
<td>606.1</td>
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Note: MSS SP-80 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**

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<th>DOCUMENT NUMBER</th>
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<tbody>
<tr>
<td>MSS SP-44-2016</td>
<td>Steel Pipeline Flanges</td>
<td>Fittings</td>
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<tr>
<td>(R2017)-2019</td>
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<tr>
<td>MSS SP-106-2012</td>
<td>Cast Copper Alloy Flanges and Flanged Fittings: Class 125, 150, and 300</td>
<td>Fittings</td>
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<tr>
<td>MSS SP-123-2013</td>
<td>Non-Ferrous Threaded and Solder-Joint Unions for Use with Copper Water Tube</td>
<td>Joints</td>
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(portions of table not shown remains unchanged)

SUBSTANTIATION:
The above revisions reflect the latest updates to the MSS standards that are referenced in Table 1701.1 and Table 1701.2.
Proposals

Item #: 339
UPC 2024 Section: Table 1701.1, Table 1701.2

SUBMITTER: Alex Ing
NFPA

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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<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>
</tr>
<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>
</tr>
<tr>
<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>
</tr>
<tr>
<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

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
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</table>

(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.
**Proposals**

**Item #: 340**

UPC 2024  Section: Table 1701.1, Table 1701.2

**SUBMITTER:** Jeremy Brown  
**NSF**

**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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<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 359-2018</td>
<td>Valves for Crosslinked Polyethylene (PEX) Water Distribution Tubing Systems</td>
<td>Valves</td>
<td>606.1</td>
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(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.
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<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
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<tr>
<td>NSF/ANSI 2-2018-2019</td>
<td>Food Equipment</td>
<td>Appliances</td>
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<tr>
<td>NSF/ANSI 4-2016-2019</td>
<td>Commercial Cooking, Rethermalization, and Powered Hot Food Holding and Transportation Equipment</td>
<td>Appliances</td>
</tr>
<tr>
<td>NSF/ANSI 5-2016-2019</td>
<td>Water Heaters, Hot Water Supply Boilers, and Heat Recovery Equipment</td>
<td>Appliances</td>
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<tr>
<td>NSF/ANSI 12-2018</td>
<td>Automatic Ice Making Equipment</td>
<td>Appliances</td>
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<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 40-2018-2019</td>
<td>Residential Wastewater Treatment Systems</td>
<td>DWV Components</td>
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<tr>
<td>NSF/ANSI 46-2018-2020</td>
<td>Evaluation of Components and Devices Used in Wastewater Treatment Systems</td>
<td>DWV Components</td>
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<tr>
<td>NSF/ANSI 169-2016</td>
<td>Special Purpose Food Equipment and Devices</td>
<td>Appliances</td>
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**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>
<thead>
<tr>
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<tr>
<td>PDI G-102-2009</td>
<td>Testing and Certification for Grease Interceptors with FOG Sensing and Alarm Devices</td>
<td>Certification</td>
<td>1014.1</td>
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(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
Proposals

Item #: 342
UPC 2024  Section: Table 1701.1, Table 1701.2

SUBMITTER: John Taecker  
UL LLC

RECOMMENDATION: Revise text

<table>
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<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>
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<tr>
<td>UL 441-2016</td>
<td>Gas Vents (with revisions through July 27, 2018-August 28, 2019)</td>
<td>Fuel Gas, Vents</td>
<td>509.1</td>
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<td>UL 467-2013</td>
<td>Grounding and Bonding Equipment (with revisions through June 7, 2017)</td>
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<td>1211.2.5</td>
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<td>UL 651-2011</td>
<td>Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings (with revisions through June 15, 2016-March 24, 2020)</td>
<td>Piping</td>
<td>1208.6.6</td>
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<td>UL 778-2016</td>
<td>Motor-Operated Water Pumps (with revisions through January 17, 2019-August 11, 2020)</td>
<td>Appliances</td>
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<td>UL 921-2016-2020</td>
<td>Commercial Dishwashers (with revisions through September 20, 2017)</td>
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<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>
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<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>
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<td>UL 1777-2015</td>
<td>Chimney Liners (with revisions through April 11, 2019)</td>
<td>Chimney Liners</td>
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(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.
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<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>
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<td>UL 144-2012</td>
<td>LP-Gas Regulators (with revisions through November 5, 2014 - December 10, 2019)</td>
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<td>UL 296-2017</td>
<td>Oil Burners (with revisions through November 29, 2017 - January 8, 2021)</td>
<td>Fuel Gas, Appliances</td>
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<td>UL 429-2013</td>
<td>Electrically Operated Valves (with revisions through January 16, 2020)</td>
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<td>UL 536-2014</td>
<td>Flexible Metallic Hose (with revisions through December 10, 2019)</td>
<td>Fuel Gas</td>
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<td>UL 563-2009</td>
<td>Ice Makers (with revisions through August 30, 2018 - July 23, 2020)</td>
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<td>UL 1331-2005</td>
<td>Station Inlets and Outlets (with revisions through May 12, 2017 - February 5, 2020)</td>
<td>Medical Gas</td>
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<td>UL 1951-2011</td>
<td>Electric Plumbing Accessories (with revisions through August 26, 2017 - June 27, 2020)</td>
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<td>UL 2157-2018</td>
<td>Electric Clothes Washing Machines and Extractors (with revisions through September 20, 2019)</td>
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**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

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SUBSTANTIATION:
The above revisions reflect the latest updates to the ASHRAE standards that are referenced in Table 1701.2.
Proposals

Item #: 344
UPC 2024  Section: Table 1701.2

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

RECOMMENDATION:  
Add new text

<table>
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<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
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<tr>
<td>EPA WaterSense-2018</td>
<td>Specification for Showerheads</td>
<td>Fixtures</td>
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(portions of table not shown remains unchanged)

SUBSTANTIATION:  
EPA's WaterSense Specification for Showerheads is referenced in Section L 402.6.
Proposals

Item #: 345

UPC 2024  Section: Table 1701.2

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

RECOMMENDATION: 
Add new text

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(portions of table not shown remains unchanged)

SUBSTANTIATION: 
EPA’s WaterSense Specification for Flushometer-Valve Water Closets is referenced in Section L 402.2.2.
Proposals

Item #: 346
UPC 2024  Section: Table 1701.2

SUBMITTER: Ken Cornwall
ProVent Systems

RECOMMENDATION:
Add new text

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 359-2019a</td>
<td>Flexible Expansion Couplings for DWV Stack Applications</td>
<td>Thermal Expansion</td>
</tr>
</tbody>
</table>

(portions of table not shown remain unchanged)

SUBSTANTIATION:
IAPMO IGC 327 and IAPMO PS 51 are already addressed in Table 1701.2 as standards that cover expansion of piping. IAPMO IGC 359 is designed for thermal expansion in high-rise buildings and will benefit the end user as option for controlling thermal expansion.
Proposals

Item #: 347
UPC 2024  Section: 1701.2

SUBMITTER: Jeremy Brown
NSF International

RECOMMENDATION:
Add new text

<table>
<thead>
<tr>
<th>DOCUMENT NUMBER</th>
<th>DOCUMENT TITLE</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF/ANSI/CAN 372-2020</td>
<td>Drinking Water System Components - Lead Content</td>
<td>Miscellaneous</td>
</tr>
</tbody>
</table>

(portions of table not shown remains unchanged)

SUBSTANTIATION:
When Section 604.2 Lead Content was added to the code, it was set up to mirror the language in the US Safe Drinking Water Act. At that time, NSF/ANSI 372 was not referenced in the code because some proponents felt there could be other ways to demonstrate compliance with the code without using this standard. NSF/ANSI/CAN 372 is the American and Canadian National Standard for determining lead content and the vast majority of products on the market do use this standard for determining lead content. Therefore it is appropriate to be referenced in 1701.2.