2018 to 2021 Uniform Plumbing Code Changes

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Who am I?

Background & Contact information:

• Master & Journeyman Plumber:
  • Canada (also Gas Fitter & Steamfitter)
  • Oregon (Montana reciprocal State)
  • Alabama
• Plumbing & Mechanical Inspector
• Field Manager & IWSH Director of N. American Projects
• Humanitarian
Question:
Who are you?
• (a) plumbing inspector
• (b) journeyman or Master plumber
• (c) engineer, designer, architect
• (d) more than one of the above, or none of the above

“The society which scorns excellence in plumbing as a humble activity and tolerates shoddiness in philosophy because it is an exalted activity will have neither good plumbing nor good philosophy: neither its pipes nor its theories will hold water.”

John William Gardner

What to expect?
This class will focus on:
• 2018 to 2021 UPC changes
• New provisions & chapters
• Montana Amendments
• Opportunities for interaction:
  • Q&A
  • Scenarios
  • Many relevant photographs!

Legend
Symbols to indicate changes

Section Relocation
Indicates what moved & where it is now located…
• Found on pp. xv and xvi
• Very helpful quick reference guide

Chapter 1
Administration
• Overview: There have been no changes to this chapter from 2018 edition.
• 101.2 Scope. The provisions of this code shall apply to the erection, installation, alteration, repair, relocation, replacement, addition to, use, or maintenance of plumbing systems within this jurisdiction.
• 101.3 Purpose. This code is an ordinance providing minimum requirements and standards for the protection of the public health, safety, and welfare.
• “minimum standards”
• Goal? Protect “…public health, safety & welfare…”

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Montana amendments

Additions to & deletions from model code

• All of these may be found at Montana Department of Labor & Industry, Business Standards Division, web site under “Current Codes”

• http://www.mtrules.org/gateway/Subchaperto:html%3A%2F%2Farr%3A301.3

• Class will sequentially incorporate all Montana plumbing amendments

24.301.146 (1, 2 & 3)
References to other codes

• (1) The following modifications to the IBC are applicable to both the department’s enforcement program and local government building code enforcement programs.

• (2) Subsection 101.4, Referenced Codes, is modified by adding the following: “Any reference to a separate specialty code, by title, either in this subsection or elsewhere in this code, shall be considered deleted and replaced with the title of the model code adopted and in effect at the time as applicable.”

• (3) Subsection 101.4.3, Plumbing is modified by:
  • (a) Deleting “International Plumbing Code” and replacing with “Uniform Plumbing Code.”

24.301.146 (25 & 26)
Minimum number of Plumbing Fixtures Uniform Plumbing Code

• (25) Table 2902.1 MINIMUM NUMBER OF PLUMBING FIXTURES, is modified by deleting and replacing with ARM 24.301.351.

• (26) Subsection 2902.3, Required Public Toilet Facilities, is deleted in its entirety and replaced with "Required Public Toilet Facilities shall be provided in accordance with the Uniform Plumbing Code 2021 Section 422.4."

This takes these minimum requirements out of the International Building Code IBC and replaces them with UPC provisions.

24.301.154 (3)
INCORPORATION BY REFERENCE OF IRC

• (3) Chapters 11 through 14, inclusive, are deleted in their entirety and chapters 16 through 43 are deleted in their entirety...

These chapters include IRC “plumbing” provisions. It takes all plumbing out of the IRC, replacing them with UPC provisions.

24.301.172 (1) (b)
INCORPORATION BY REFERENCE OF IMC

• (1) (a) Subsection 102.8, Referenced Codes and Standards, is modified by adding the following: “Any reference to a separate specialty building regulation, by title, either in this subsection or elsewhere in this code, shall be considered deleted and replaced with the title of the model code adopted by the department and in effect at the time.

• (b) All references to the International Plumbing Code shall be deleted and replaced with the Uniform Plumbing Code.

• It takes all plumbing out of the IMC, replacing them with UPC provisions.

24.301.173 (1) (b)
INCORPORATION BY REFERENCE OF IMC

• (1) (a) Subsection 102.8, Referenced Codes and Standards, is modified by adding the following: “Any reference to a separate specialty building regulation, by title, either in this subsection or elsewhere in this code, shall be considered deleted and replaced with the title of the model code adopted by the department and in effect at the time. For example, all references to the International Plumbing Code shall be deleted and replaced with the Uniform Plumbing Code.

• It takes all plumbing out of the IFGC, replacing them with UPC provisions.
24.301.301 Incorporation by reference of Uniform Plumbing Code

(1) The department adopts and incorporates by reference the Uniform Plumbing Code, 2021 edition, unless another edition is specifically stated, together with the following appendix chapters and amendments:

(a) Appendix A, Recommended Rules for Sizing the Water Supply System is adopted.

(b) Appendix B, Explanatory Notes on Combination Waste and Vent systems is adopted.

(c) Appendix C, Alternate Plumbing Systems is adopted.

(d) Appendix D, Sizing Stormwater Drainage systems is adopted.

(e) Appendix K, Potable Rainwater Catchment Systems is adopted.

(f) Appendix L, Sustainable Practices is adopted.

(g) Appendix M, Peak Water Demand Calculator is adopted.

(h) Appendix N, Impact of Water Temperature on the Potential for Scalding and Legionella Growth.

24.301.301 (2) Montana Amendment

The purpose of this code is to provide minimum requirements and standards for plumbing installations for the protection of the public health, safety, and welfare. The Uniform Plumbing Code is a nationally recognized model code setting forth minimum standards and requirements for plumbing installations. A copy of the Uniform Plumbing Code may be obtained from the International Association of Plumbing and Mechanical Officials at www.iapmo.org.

24.301.301 (1) (a)-(h) Montana amendment

Subsection 103.3.1, Licensing is amended with the addition of the following language:

"Provision for licensing shall be determined by the Authority Having Jurisdiction. The requirements for who must be licensed to perform plumbing work is regulated by Title 37, chapter 69, MCA."

(1) (e) Subsections 104.1, 104.2, 104.3, 104.3.2, 104.4, 104.5, 105.0, 105.4, 106.1, 106.3 and 107.0 will be left as is for use by local governments (i.e., municipalities and counties), but will not be used by the department and the state of Montana. For the purposes of enforcement by the department, these subsections are replaced with provisions of Title 50, chapter 60, part 5, MCA.

24.301.301 (1) (d) Montana amendment

Subsection 103.3.1, Licensing is amended with the addition of the following language:

"Provision for licensing shall be determined by the Authority Having Jurisdiction. The requirements for who must be licensed to perform plumbing work is regulated by Title 37, chapter 69, MCA."

"(1) (e) Subsections 104.1, 104.2, 104.3, 104.3.2, 104.4, 104.5, 105.0, 105.4, 106.1, 106.3 and 107.0 will be left as is for use by local governments (i.e., municipalities and counties), but will not be used by the department and the state of Montana. For the purposes of enforcement by the department, these subsections are replaced with provisions of Title 50, chapter 60, part 5, MCA."

24.301.301 (1) (e) Montana amendment

(i) No permit is required for any minor replacement or repair work, the performance of which does not have a significant potential for creating a condition hazardous to public health and safety.

(ii) No permit is required where the installation is exempt under provisions of 50-60-503 or 50-60-506, MCA.

(iii) The requirements for permits do not apply to regularly employed maintenance personnel doing maintenance work on the business premises of their employer unless work is subject to the permit provisions of these rules.
Factory-built buildings covered by an insignia issued by the department need not have a plumbing permit for the construction of the unit; however, a permit will still be required for on-site work, as provided for in these rules.

Montana amendment

Delete Table 104.5 – PLUMBING PERMIT FEES and replace with the following schedule:

(i) for each plumbing fixture $10

(ii) water service – domestic or commercial 20

(iii) for each building sewer and each trailer park sewer 20

(iv) storm drains and storm drainage 20

(v) for each water heater (replacement or new) 25

(vi) for each industrial water pretreatment interceptor, including its tray and vent, excepting kitchen type grease interceptors functioning as fixture traps 30

• (vii) for alteration or repair of water piping and/or water treatment equipment 30

• (viii) for repair or alteration of drainage or vent piping 30

• (ix) for each lawn sprinkler system and fire protection system or any one meter, including backflow protection devices therefore 30

• (x) for each hose bibb, vacuum breakers, or backflow protective devices on tanks, vats, etc., or for installation on unprotected plumbing fixtures, including necessary water piping 6 each

• (xi) requested plumbing inspection fee (provided that such service is not in excess of one hour duration, and then in $35 for each 30 minutes or fractional part thereof in excess of one hour. Travel and per diem may be charged as per the state of Montana’s existing rate for these items) 75

• (xii) reinspection (provided the $30 does not exceed the original permit fee, in which case the original fee will be charged) 45

• (xiii) for each medical gas type/piping system as follows:

• (A) oxygen piping 100

• (B) nitrogen piping 100

• (C) medical compressed air piping 100

• (D) nitrous oxide piping 100

• (E) carbon dioxide piping 100

• (G) any other medical gas piping not included above in (A) through (F) 100

• (H) if total outlets for all gases/vacuum piping exceed 20 outlets, then there is an additional fee for each outlet over 20 10

• (xiv) for each gray water system (commercial or residential) 60
Chapter 1
104.0 Permits

• This section and its sub-sections deal with the matter of plumbing permits.

• Montana added several amendments which will now be considered…

104.0 Permits
Chapter 1
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24.301.361
Montana amendment

• (1) Any person who is required under 50-60-505, MCA to obtain a plumbing permit, and the work is not covered by a local government inspection program, shall do so prior to installation through the department.

• (2) The exception to the plumbing permit requirement listed in 50-60-503, MCA, for plumbing installations on farms having their own individual water supply or sewage disposal system applies to farm and ranch installations used in conjunction with an agricultural or livestock raising operation which are not connected to either a public water supply or public sewer system. Any building used as or in conjunction with a hotel, bed and breakfast establishment, or other place where sleeping accommodations are furnished to transient guests for a fee is subject to the requirements of ARM 24.301.301.

24.301.361
Montana amendment

• (3) The exception to the plumbing permit requirement listed in 50-60-506(4), MCA, for the owner of residential property applies to the owner of a single-family dwelling who does the work on the plumbing installation in the dwelling in which they will reside. The “homeowner exemption” applies to those dwellings intended for the owner’s personal use and not for dwellings built on speculation of resale or intended as rental property.

• (4) The exception to permit requirements listed in 50-60-506(5), MCA, for regularly employed maintenance personnel doing maintenance work on the business premises applies to personnel on the regular payroll rather than personnel under contract. Maintenance work includes the stopping of leaks in pipes, valves, or fixtures, when such repairs do not involve or require the replacement or rearrangement of valves, pipes, or fixtures.

24.301.361
Montana amendment

• (5) The applicant shall complete the plumbing application form and designate in the spaces provided the items to be covered by the plumbing permit.

• (6) No plumbing permit shall be issued for a building or structure under the jurisdiction of the department, until the building permit has been issued for said building or structure.

• (7) After review and approval of the application, the department shall issue a permit to the applicant.

Chapter 1
105.0 Inspections and Testing

• This section and its sub-sections deal with the matter of plumbing inspections.

• Montana added several amendments which will now be considered…

24.301.371
Montana amendment

• (1) When the permit holder is ready for inspection, he shall notify the department either orally or in writing. The notification shall be given not less than 24 hours before the work is to be inspected. To assist the department with its scheduling of inspections, it is asked that inspection requests be made as much in advance of the 24-hour minimum notice time as possible. Cover (rough-in) inspections are made by a state plumbing inspector wherever possible. Insulation and wallboard shall not be applied prior to inspections unless 48 hours, excluding Saturdays, Sundays and holidays have expired after the plumbing installation is complete and notice to inspect has been received.
The permit holder shall be responsible for assuring that the plumbing work is not covered before the department has granted permission to cover said work. The inspection shall be made during daylight hours unless it is more convenient to all parties involved to make the inspection at night.

Upon completion of the final inspection and approval of the plumbing work, the department shall, if requested, issue the permit holder a certificate of compliance.

If the inspection reveals code violations, the permit holder shall be given an opportunity to make corrections. If after reinspection the violation has been corrected, the permit holder shall be issued a certificate of compliance. If such violation is not corrected, the permit holder or other responsible persons will be charged as per 50-60-110, MCA.

Plumbing inspectors shall not inspect any plumbing work in which they have any financial or personal interest, or which they have installed or repaired. (This is a new provision!)

Words have meaning...
Define the word “stock”...
(a) liquid made by stewing bones & vegetables, as in soup broth
(b) to assess, as in take “stock” of a situation
(c) a store of goods
(d) farm animals, as in livestock
(e) timber frame with holes to hold criminals for public punishment
(f) support or handle for an implement or gun
(g) shares or financial interest in a company, as in “stock market”
(h) reputation – his “stock” is rising as he continues to excel at work

A Category 3 vacuum distribution system that can be either a wet system designed to remove liquids, air-gas, or solid from the treated area; or a dry system designed to trap liquids and solids before the service inlet and to accommodate air-gas only through the service inlet. [NFPA 99:3.3.21]
205.0
Circuit Vent (new)

- The vent that connects to a horizontal drainage branch and vents two traps to a maximum of eight traps connected into a battery of fixtures.

205.0
Commercial Modular System (new)

- A drinking water treatment unit system consisting of multiple components attached to a manifold, produced specifically for food service applications, and not intended for use in residential applications.

206.0
Dead Leg (new)

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

- New definition, necessary for section 309.6

- Relates also to Appendix N, dealing with Legionella

206.0 Dead Leg
Continued…

- Many installations are dead legs:
  - Capped ends
  - Futures

- What is the issue?
  - Legionella
  - Water stagnation

207.0
Expansion Tank (new)

- A vessel used to protect potable water systems from excessive pressure.

209.0
General Anesthesia and Levels of Sedation/Analgesia (new)

- 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]
• **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]

• **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]

• **Moderate Sedation/Analgesia (Conscious Sedation).** A drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained. [NFPA 99:3.3.66.3]
209.0
Group Wash Fixture (new)

• A lavatory that allows more than one person to utilize the fixture at the same time. The fixture has one or more drains and one or more faucets.

214.0
Low-Pressure Water Dispenser (new)

• A terminal fitting located downstream of a pressure reducing valve that dispenses drinking hot water above 71°C (160°F) or cold water or both at a pressure of 105kPa (15psi) or less.
216.0
Nonwater Urinal with Drain Cleansing Action (new)

• A non-water urinal that conveys waste into the drainage system without the use of water for flushing and automatically performs a drain-cleansing action after a pre-determined amount of time.

24.301.301 (1) (I)
Montana amendment

• (1) (I) 218.0 Definition of Plumbing System is amended to read: Includes all potable water and alternate water sources including supply and distribution pipes, all plumbing fixtures and traps, all drainage and vent pipes, building drains and building sewers, including their respective joints and connections, devices, receptacles, and appurtenances within the property line of any premises, and includes water heaters and vents for the premises.

218.0
Point-of-Entry, Water Treatment Unit (new)

• A device serving the water distribution system of a building for the purposes of altering, modifying, adding, or removing minerals, chemicals, contaminants, and suspended solids in water.

218.0
Point-of-Use, Water Treatment Unit (new)

• A device serving a single atmospheric outlet such as a faucet for the purposes of altering, modifying, adding, or removing minerals, chemicals, contaminants, and suspended solids in water.

There are many different models...
Maintenance is essential!
218.0
Pre-Fabricated Shower Enclosure (new)

• A factory-assembled watertight structure with enclosing walls, a drain, and a door or access way.

218.0
Private or Private Use

• Applies to plumbing fixtures in residences and apartments, to private bathrooms in hotels, hospitals, and health-care facilities, and to restrooms in commercial establishments where the fixtures are intended for the use of a family or an individual.

• New phrase added

218.0
Public Water System (new)

• A system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of twenty-five individuals daily for at least 60 days per year.

224.0
Vent Offset

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

• One word deleted…

Question
Which of these constitutes a “dead leg”?

• (A) a 2” long section of 1” Type K copper water tube with a cap

• (B) water pipe provided for future fixtures

• (C) waterline roughed in at a non-water urinal for future retrofit of a water-supplied urinal

• (D) all of the above
Chapter 3
General Regulations

- Predominantly minor changes
- One new section added
- No Montana amendments

301.2
Minimum Standards.

- Pipe, pipe fittings, traps, fixtures, material, and devices used in a plumbing system shall be listed (third-party certified) by a listing agency (accredited conformity assessment body) as complying with the approved applicable recognized standards referenced in this 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 (AHJ) for approval prior to being installed.
- New verbiage added

301.2.2
Standards.

- ... A list of plumbing standards that appear in specific sections of this code is referenced in Table 1701.1. Standards referenced in Table 1701.1 shall be applied as indicated in the applicable referenced section. A list of additional approved standards, publications, practices, and guides that are not referenced in specific sections of this code appear in Table 1701.2. The documents indicated in Table 1701.2 shall be permitted in accordance with Section 301.3. An IAPMO Installation Standard is referenced in Appendix I for the convenience of the users of this code. It is not considered as part of this code unless formally adopted as such by the AHJ.
- New word added, sentence deleted

Creativity abounds...
And it even "works"...

- ...but does this conform to UPC requirements?
Unlisted Urinal
Creative, but...

- This installation may fit well in a pub, tavern or similar establishment, however...

Dead Legs
Continued...

- Dead legs shall have a method of flushing.
- What constitutes this?
  - A valve?
  - Sediment faucet or boiler drain?
  - Removable plug or cap?
- Enforcement to ensure flushing occurs?

Chapter 4
Plumbing Fixtures and Fixture Fittings

- Ten changes
- Hot water temperature limitations at various fixtures:
  - Public lavatories
  - Gang showers
  - Bathtubs & whirlpool bathtubs
  - Bidets
- New devices
- Other minor changes


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

*WC Flange*

- This is an “offset” WC Flange:
  - (A) True
  - (B) False

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**407.3**

Limitation of Hot Water Temperature for Public Lavatories.

- Hot water delivered from public-use lavatories shall be limited to a maximum temperature of 120°F (49°C). The water heater thermostat shall not be considered a control for meeting this provision. 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
  - (2) A water heater conforming to ASSE 1084.

---

**Water temperature at fixtures...**

**How is it verified?**

- A calibrated thermometer must be used!

- Do not rely on guesses by holding your hand under the tap...

- Keep a record findings at time of installation or inspection.
408.1 Application.


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.

- Reworded, however essence remains 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,
    - (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.
The immediate adjoining space to showers without thresholds. 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.

Wet location...

The maximum hot water temperature discharging from the bathtub and whirlpool bathtub filler shall be limited to 120°F (49°C). The water heater thermostat shall not be considered a control for meeting this provision. 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.

Limitation of Hot Water Temperature in Bathtubs & Whirlpool Bathtubs.

The maximum hot water temperature discharging from a bidet shall be limited to 110°F (43°C) by a device that complies with ASSE 1070/ASME A112.1070/CSA B125.70. The water heater thermostat shall not be considered a control for meeting this provision. 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.

Limitation of Water Temperature in Bidets.

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.

Nonwater Urinals with Drain Cleansing Action.
Table 422.1, Minimum Plumbing Facilities, is deleted and replaced with ARM 24.301.351, Minimum Required Plumbing Fixtures.

• Quite a few changes...
• Focus on "plumbing" changes
• Many have to do with "mechanical" side of water heater installations
  • Since Montana utilizes IMC, we will **NOT** go into these...

Water Heaters

Table 501.1(1)

- New category, "Electric Instantaneous"
- Changes to Gas:
  - Added "storage and instantaneous"
- Changes to Electric:
  - Added "storage"

Seismic Provisions.

- In seismic design categories C, D, E, and F, Water heaters shall be anchored or strapped to resist horizontal displacement due to earthquake motion. Strapping shall be at points within the upper one-third and lower one-third of its vertical dimensions. At the lower point, a distance of not less than 4 inches (102mm) shall be maintained from the controls with the strapping.
- Now all water heaters, everywhere...

Seismic strap...
• Subsection 507.13, REPEAL: Gas utilization equipment, or any equipment that generates a glow, spark, or flame, in residential garages and in adjacent spaces that open to the garage and are not part of the living space for a dwelling unit, shall be so installed that all burners, burner-ignition devices, and heating elements are located not less than 18 inches (450mm) above the floor, unless listed as flammable vapor ignition resistant.

• This subsection is deleted!

Montana amendment

507.23
Combination of Appliances and Equipment.

A Any combination of appliances, equipment, attachments, or devices used together in any manner shall be in accordance with the standards that apply to the individual appliance and equipment. [NFPA 54.9.1.21]

507.24
Installation Instructions.

• The installing agency shall comply with the appliance and equipment manufacturer’s installation instructions recommendations in completing an installation. The installing agency 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 AHJ, service personnel, and the owner or operator. [NFPA 54.9.1.22]

HWT instructions

Shall be available to inspector, owner and consumer

This subsection is deleted!
Guards and Rails.

508.2.1.1

• 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 (1829mm).
  • (2) The open end of the equipment platform is located more than 30 inches (762mm) 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 (533mm) diameter ball, resist the imposed loading conditions, and shall extend not less than 30 inches (762mm) 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 Z359.1 is installed.

Guards and Rails.

508.2.1.1

Buildings more than 15 feet (4572 mm) in height shall have an inside means of access to the roof, unless other means acceptable to the AHJ are used. [NFPA 54:9.4.3.2]

Access.

508.3.1

• Exterior roof access permitted

• Security (unauthorized access) is a real concern...

Consult with AHJ

Roof Access

Plastic Piping.

509.4.1

• Where plastic piping is used to vent an appliance, the appliance shall be listed for use with such venting materials and the appliance manufacturer’s installation instructions shall identify the specific plastic piping material. The plastic pipe venting shall be labeled in accordance with the product standards specified by the appliance manufacturer or shall be listed and labeled in accordance with UL 1738. [NFPA 54:12.5.2]

Plastic Piping.

509.4.1

• Piping shall be marked for gas appliance venting use.
509.4.2 Plastic Vent Joints.

• Plastic pipe and fittings used to vent appliances shall be installed in accordance with the manufacturer’s installation instructions. Plastic pipe venting materials listed and labeled in accordance with UL 1738 shall be installed in accordance with the vent manufacturer’s installation instructions. Where primer is required, it shall be of a contrasting color. [NFPA 54:12.5.3]

Chapter 6

Water Supply and Distribution

• Several new sections
• Several amended or re-arranged sections
• One new table; significant changes to another
• Several Montana amendments

601.2 Water Supply and Flushing.

• (formerly “Hot and Cold Water Required”)
  • Except where not deemed necessary for safety or sanitation by the AHJ, 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. Water closets and urinals shall be flushed using an approved flush tank or flushometer valve.

601.2 Water Supply and Flushing (continued)

• Exceptions:
  • (1) Listed fixtures that do not require water for their operation and are not connected to the water supply.
  • (2) Where not deemed necessary for safety and sanitation by the AHJ.

601.2.1 Hot and Cold Water Required

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

601.3.4 Fixtures.

• Where vacuum breakers or backflow preventers are installed with fixtures listed in Table 1701.1 Chapter 17, identification of the discharge side shall be permitted to be omitted.
AVB at shower...

Speaking of AAV's

See anything wrong?

24.301.301 (1) (k)
Montana amendment - REPEAL

• 603.2 Approval of Devices or Assemblies. Before any devices or assembly is installed for the prevention of backflow, it shall have first been tested for conformity with recognized standards or other standards acceptable to the AHJ, so long as those standards are consistent with the intent of this code. All 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. If 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 another device or assembly substituted, without the approval of the AHJ.

Table 603.2
BACKFLOW PREVENTION DEVICES, ASSEMBLIES AND METHODS

• There are four (4) significant additions to this table:
  • Dual check backflow preventer
  • Backflow preventer with intermediate atmospheric vent
  • Backflow preventer with intermediate atmospheric vent and pressure reducing valve
  • Laboratory faucet backflow preventer
  • Each will be considered now…

Table 603.2
BACKFLOW PREVENTION DEVICES, ASSEMBLIES AND METHODS

• Dual check backflow preventer
• Applicable standard – ASSE 1024
• Degree of Hazard – Pollution (Low Hazard)
• Suitable for back siphonage and back pressure
• Installation notes: Installation does not include carbonated drink dispensers.

Table 603.2
BACKFLOW PREVENTION DEVICES, ASSEMBLIES AND METHODS

• Backflow preventer with intermediate atmospheric vent
• Applicable standard – ASSE 1012
• Degree of Hazard – Pollution (Low Hazard)
• Suitable for back siphonage and back pressure
• Installation notes: Installation of potable water connections to water boilers. No high hazard chemicals shall be introduced into the system using such devices. Designed to operate under continuous pressure conditions. May discharge water.
Table 603.2
BACKFLOW PREVENTION DEVICES, ASSEMBLIES AND METHODS

- Backflow preventer with intermediate atmospheric vent and pressure reducing valve
- Applicable standard – ASSE 1081
- Degree of Hazard – Pollution (Low Hazard)
- Suitable for back siphonage and back pressure
- Installation notes: Installation of potable water connections to water boilers. No high hazard chemicals shall be introduced into the system using such devices. Designed to operate under continuous pressure conditions. May discharge water.

Table 603.2
BACKFLOW PREVENTION DEVICES, ASSEMBLIES AND METHODS

- Laboratory faucet backflow preventer
- Applicable Standard – ASSE 1035
- Suitable for Pollution (High Hazard)
- Suitable for back siphonage and back pressure
- Installation includes laboratory faucets. Such devices are not for use under continuous pressure conditions. No valve downstream.
- * Not to be subjected to operating pressure for more than 12 hours in a 24 hour period.

Tentative Interim Amendment (TIA)

What is this?

- TIA indicates that the revision is the result of a Tentative Interim Amendment. For further information on tentative interim amendments see Section 5 of the IAPMO Regulations Governing Committee Projects available at http://codes.iapmo.org
- Proposal requests are balloted through Plumbing Technical Committee (TC), where ¾ majority must pass
- TC makes a recommendation
- IAPMO Standards Council performs full review, hears testimony, votes then renders their decision

Chemical dispenser...

- Often connected directly to mop (janitor’s) sink to spout, downstream of integral AVB
- Also common in commercial kitchens in dishwashing area
• A dual check backflow preventer consists of two independently acting check valves, force loaded to a normally closed position.

603.3.11
Laboratory Faucet Backflow Preventers.

• Laboratory faucet backflow preventers shall comply with ASSE 1035.

603.3.12
Backflow Preventer with Intermediate Atmospheric Vent.

• A backflow preventer with intermediate atmospheric vent consists of two independently acting check valves force loaded to a normally closed position, and an intermediate chamber with a means for automatically venting to atmosphere, force loaded to a normally open position.

24.301.301
Montana amendment

• Delete subsection 603.4.2 Testing.

• (There were minor changes to Model Code provisions.)
603.5.10
Steam or Hot Water Boilers.

- Potable water connections to steam or hot water boilers shall be protected from backflow by a double check valve assembly, backflow preventer with intermediate atmospheric vent and pressure reducing valve, or reduced pressure principle backflow prevention assembly in accordance with Table 603.2. Where chemicals are introduced into the system a reduced pressure principle backflow prevention assembly shall be provided in accordance with Table 603.2.
- Change brings model code more closely in line with Montana amendment, similar yet different, next slide…

24.301.301 (1) (o)
Montana amendment

- 603.5.10 is amended by adding the following language:

  - Boiler feed lines, in single-family dwellings on their own private well, may be protected with a dual check valve with intermediate atmospheric vent when a nontoxic transfer fluid is utilized in the boiler.

  - Note: This is a different device than Model Code added and is restricted to SFR applications only

24.301.301 (1) (m)
Montana amendment - REPEAL

- 603.5.12 Beverage Dispensers. Potable water supply to carbonated beverage dispensers, or coffee machines that may produce back pressure shall be protected by an air gap or approved 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.
- Reverts to model code verbiage
TIA – 603.5.21

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>STANDARD TITLE</th>
<th>APPLICATION</th>
<th>REFERENCED SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSE 1055</td>
<td>Chemical Dispensers: Steam, Water with Integral Backflow Protection</td>
<td>ASSE 1055</td>
<td>603.5.21</td>
</tr>
</tbody>
</table>

603.5.21 Chemical Dispensers. The water supply to the 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. Self-resistive pressure vacuum breaker (SVB)
5. Reduced pressure principle backflow prevention assembly (RPB)

(Section 603.5.21 is being shown to update the standard designation only. No changes are being made to the existing requirements to the section.)

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 approved 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 of the socket surface and the outside surface of the pipe are wet with solvent cement. Hold the joint in place and undisturbed for 1 minute after assembly.

24.301.301 (1) (p)
Montana amendment

• 604.3 Copper or Copper Alloy Tube. Copper or copper alloy tube for water piping shall have a weight of not less than Type L.
• Exception: Type M copper tubing may be used for water piping when piping is above ground in, or on a building.

24.301.301 (1) (q)
Montana amendment

• 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 approved 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 of the socket surface and the outside surface of the pipe are wet with solvent cement. Hold the joint in place and undisturbed for 1 minute after assembly.

606.8
Check Valve Required.

• All systems that circulate water by means of a pump or other mechanical device or method shall have a check valve(s) or equal device(s) installed so as to ensure the direction of flow.
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.

- Key word, “where”!

608.3
Expansion Tanks, Combination Temperature 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 similar function to control thermal expansion. Pre-pressurized 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.

PRV’s
Bypass…

- Some pressure reducing valves (PRV) are internally bypassed, allowing dissipation into municipal mains
608.5
Discharge piping.

• The discharge piping serving a temperature relief valve, pressure relief valve, or combination of both shall have no valves, obstructions, or means of isolation and be provided with the following:
  
• (1) Equal to Not less than the size of the valve outlet and shall discharge full size to the flood level of the area receiving the discharge and pointing down.

• (8) The discharge termination point shall be readily observable.

TPRV discharge
Does this comply with 608.5?

• No! several code violations:
  
• PEX within first 18” of HWT
• PEX uses insert fittings (not full size, although nominally same size)
• If TPRV activates, will this remain pointed toward ground, or will it whip about?

TPRV discharge
Continued…

• Before & after
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.

24.301.301 (1) (r)

Montana amendment

- 609.11 Pipe Insulation.

- Due to a new section added, “Pipe Insulation” was re-numbered to 609.12
- Delete in its entirety

611.0

Drinking Water Treatment Units.

- Re-formatted, some content moved to new table 611.1.
- 611.1 Application. Drinking water treatment units shall comply with the applicable referenced standards in Table 611.1.
- 611.1.1 Alkaline Water Treatment. Alkaline water treatment devices shall comply with IAPMO IGC 322.
- 611.1.2 Scale Reduction Devices. Scale reduction devices shall comply with IAPMO Z601.

Table 611.1

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>POINT OF USE</th>
<th>POINT OF ENTRY</th>
<th>COMMERCIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline Treatment</td>
<td>NSF 42</td>
<td>NSF 42</td>
<td>ASSE 1867 and NSF 42*</td>
</tr>
<tr>
<td>Scale Reduction</td>
<td>NSF 51</td>
<td>NSF 51</td>
<td>ASSE 1867 and NSF 51*</td>
</tr>
<tr>
<td>Water Softener</td>
<td>NSF 44</td>
<td>NSF 44</td>
<td>ASSE 1867</td>
</tr>
<tr>
<td>Ultraviolet Water Treatment</td>
<td>NSF 55</td>
<td>NSF 55</td>
<td>ASSE 1867</td>
</tr>
<tr>
<td>Reverse Osmosis</td>
<td>NSF 51</td>
<td>NSF 51</td>
<td>ASSE 1867</td>
</tr>
<tr>
<td>Distillation</td>
<td>NSF 82</td>
<td>NSF 82</td>
<td>ASSE 1867</td>
</tr>
</tbody>
</table>

* Required for commercial and residential systems only.
Water softener
What do they do?
- Used in areas of “hard” water
- Remove primarily calcium and magnesium from water
- Employs ion exchange from salt in a resin bed, and flushes hardness away
- Automatic operation

Softener drain...
Direct connect to inlet side of trap, no air gap...

Softener drain...
Multiple code violations...
- No air gap
- Unvented P-trap
- No primer
- San tee in horizontal branch

24.301.301 (1) (t)
Montana amendment
- 612.0 Residential Fire Sprinkler Systems.
- Delete in its entirety

Supplementary Session
Water pipe sizing review…
- We will now take some time to do a very basic review of Chapter 6, pipe sizing requirements…
Chapter 7
Sanitary Drainage

- Several model code changes
- Six Montana amendments

Let's see, if you can figure out what's going on here...
701.2
Drainage Piping.

- (2) ABS and PVC DWV piping installation 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.

Table 701.2
MATERIALS FOR DRAIN, WASTE, VENT PIPE AND FITTINGS

- Minor additions and changes, primarily having to do with new or updated standards

701.5
Lead.

- (See Table 1701.1) (See Chapter 17) Sheet lead shall comply with the following:
  - (1) For safe pans – not less than 4 pounds per square foot (lb/ft²) (19 kg/m²) or 1/16 of an inch (1.6 mm) thick.
  - (2) For flashings or vent terminals – not less than 3 lb/ft² (15 kg/m²) or 0.0472 of an inch (1.2 mm) thick.
  - (3) Lead bends and lead traps shall be not less than 1/8 of an inch (3.2 mm) in wall thickness.

24.301.301 (1) (u)
Montana amendment

- 704.3 Commercial Sinks. Pot sinks, scullery sinks, dishwashing sinks, silverware sinks, and other similar fixtures shall be connected directly to the drainage system. There may not be a direct connection between the sewerage system and any drains originating from equipment in which food, portable equipment, or utensils are placed. Exception: A warewashing (3-compartment) sink may have a direct connection only when used as a wash bin, rinse bin, and sanitizing bin and shall not be used for any other purpose. Establishments that use the sanitizing bin of their warewashing sink to wash produce or conduct other food preparation must maintain an indirect connection and are not eligible for this exception.
24.301.301 (1) (u) (continued)
Montana amendment

• 704.3 Commercial Sinks. … A floor drain shall be provided adjacent to the fixture and shall be connected on the sewer side of the sink. No other drainage shall be connected between the floor drain waste connection and the fixture drain. The fixture and floor drain shall be trapped and vented in accordance with this code.

Montana Amendment
Commercial Kitchen

• Note:

• No direct connection
• Adjacent floor drain

Table 703.2
MAXIMUM UNIT LOADING & LENGTH OF DRAINAGE/VENT PIPING

• Change to footnote 4: Only four water closets or six-unit traps allowed on a vertical pipe or stack, and not to exceed three water closets or six-unit traps on a horizontal branch or drain. Not to exceed five water closets or six-unit traps.

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

24.301.301 (1) (v)
Montana amendment

• 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 approved 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 of the socket surface and the outside surface of the pipe are wet with solvent cement. Hold the joint in place and undisturbed for 1 minute after assembly.
• Each cleanout fitting and each cleanout plug or cap shall be of an approved type. A list of approved standards for cleanouts are referenced in Table 707.2.

Table 707.2

<table>
<thead>
<tr>
<th>Material</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABS</td>
<td>ASTM D2041, CSA B76, IAPMO IGC 78, IAPMO IGC 224</td>
</tr>
<tr>
<td>Cast Iron</td>
<td>A536 11.23.2, ASTM A888, CSA 101, CSA B76, IAPMO IGC 224</td>
</tr>
<tr>
<td>Copper or Copper-Alloy</td>
<td>ASME A112.36.3, CSA B79</td>
</tr>
<tr>
<td>Ductile Iron</td>
<td>CSA B79</td>
</tr>
<tr>
<td>Enameled</td>
<td>CSA B79, IAPMO PS 50</td>
</tr>
<tr>
<td>Polyethylene (PE)</td>
<td>CSA B79</td>
</tr>
<tr>
<td>Polypropylene (PP)</td>
<td>CSA B79</td>
</tr>
<tr>
<td>PVC</td>
<td>ASTM D2665, CSA B79, IAPMO IGC 78, IAPMO IGC 224</td>
</tr>
<tr>
<td>Polyvinylidene Fluoride (PVDF)</td>
<td>Polyvinylidene Fluoride (PVDF)</td>
</tr>
</tbody>
</table>

• Just because “it works”, does NOT mean it is an approved method…

24.301.301 (1) (w)
Montana amendment

• 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 50 feet (30 480 mm) in total developed length, shall be provided with a cleanout for each 100 50 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.
24.301.301 (1) (x)
Montana amendment

- 707.9 Clearance. Each cleanout in piping...No under-floor cleanout shall be located exceeding 5 feet from an access door, trap door, or crawl hole. No under-floor cleanout shall be located exceeding 20 feet from an access door, trap door, or crawl hole.

24.301.301 (1) (y)
Montana amendment

- 708.1 General. Horizontal drainage piping shall be run in practical alignment and a uniform slope of not less than 1/4 of an inch per foot or 2 percent toward the point of disposal provided that, where it is impractical due to the depth of the street sewer or to the structural features or to the arrangement of any building or structure to obtain a slope of 1/4 of an inch per foot or 2 percent, any such pipe or piping 2 inches or larger in diameter may have a slope of not less than 1/8 of an inch per foot or 1 percent.

24.301.301 (1) (w)
Montana amendment - REPEAL

- 710.1 Backflow Protection. Where a fixture is installed on a floor level that is lower than the next upstream manhole cover of the public or private sewer serving such drainage piping may be protected from the backflow of sewage by installing an approved type backwater valve. Fixtures on floor levels above such elevation shall not discharge through the backwater valve.

- Montana verbiage was permissive, one “may” install a backwater valve; whereas model UPC uses the mandatory term “shall”

- This is a significant difference!
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. Cast-iron soil-pipes and fittings shall not be replaced using this method aboveground or belowground. Replacement using cured-in-place pipe liners shall not be used on collapsed piping or when the existing piping is compromised.

24.301.301 (1) (z)
Montana amendment

- 718.1 Slope. Building sewers shall be run in practical alignment and at a uniform slope of not less than ¼ of an inch per foot (20.8 mm/m) toward the point of disposal.
- Exception: Where it is impractical, due to the depth of the street sewer or to the structural features or to the arrangement of any building or structure, to obtain a slope of 1/4 of an inch per foot, any pipe or piping 3 inches or larger in diameter may have a slope of 1/8 of an inch per foot and any such pipe or piping 8 inches in diameter or larger may have a slope of 1/16 of an inch per foot.

Chapter 8
Indirect Wastes

- Three minor changes to model code
- One Montana amendment

804.1
Standpipe Receptors.

- Plumbing fixtures or other receptors receiving the discharge of indirect waste pipe shall be approved for the use proposed and shall be of such shape and capacity as to prevent splashing or flooding and shall be located where they are readily accessible for inspection and cleaning. No standpipe receptor for a clothes washer shall extend more than 30 inches (762 mm), or less than 18 inches (457 mm) above the floor. No trap for a clothes washer standpipe receptor shall be installed below the floor, but shall be roughed in not less than 6 inches (152 mm) and not more than 18 inches (457 mm) above the floor. No indirect waste receptor shall be installed in a toilet room, closet, cupboard, or storeroom or in a portion of the building not in general use by the occupants thereof, except standpipes for clothes washers shall be permitted to be installed in toilet and bathroom areas where the clothes washer is installed in the same room.
Question
Any UPC violations?
• Is there a vent?
• OR is this another drain into a standpipe?
• What sort of trap is this?

24.301.301 (1) (aa)
Montana amendment
• 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 airgaps shall be installed with the flood-level (FL) marking at or above the flood level of the sink or drainboard, whichever is higher.
• Exception #1: The waste connection of a residential dishwasher shall connect directly to a wye branch fitting on the tailpiece of the kitchen sink, direct to the dishwasher connection of a food waste disposer, or through an air break to a standpipe. The waste line of a residential dishwasher shall rise and be securely fastened to the underside of the sink rim or countertop.

814.2
Condensate Control.

• Where any equipment or appliance is installed in a space where damage is capable of resulting from condensate overflow, other than damage to replaceable lay-in ceiling tiles, 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:
• Options (1) through (4) are listed…

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• Several minor changes
• Several significant changes to “Circuit Venting” section 911.0 and sub-sections
• Seven (7) Montana amendments

903.1 (2) Applicable Standards.

• (2) ABS and DVC DWV piping installations shall be in accordance with 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. These tests shall comply with all requirements of the standards to include the sample size, for both width and length. Plastic pipe shall not be tested filled with water. 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.

904.2 Length.

• Not more than one-third of the total permitted length, in accordance with Table 703.2, of a minimum-sized vent shall be installed in a horizontal position. Where a minimum-sized vent is increased one pipe size for its entire length, the maximum length limitation shall not apply.
• 2nd sentence formerly an “Exception”, now is simply part of the section…

24.301.301 (1) (ab) Montana amendment

• 906.1 Roof Vent Termination. Each vent pipe or stack shall extend through its flashing and shall terminate vertically not less than 6 12 inches (152 mm) above the roof nor less than 4 one foot (305 mm) from a vertical surface. ABS and PVC piping exposed to sunlight shall be protected by water-based synthetic latex paints.
• Climate-driven amendment

• 906.3 Use of Roof. Vent pipes shall be extended separately or combined, of full required size, not less than 6 12 inches (152 mm) above the roof or firewall. Flagpoles of vents shall be prohibited except where the roof is used for assembly purposes or parking. Vents within 10 feet (3048 mm) of a part of the roof that is used for assembly purposes or parking shall extend not less than 7 feet (2134 mm) above such roof and shall securely stay.
906.7 Frost or Snow Closure: Where frost or snow closure is likely to occur in locations having a minimum design temperature below zero degrees Fahrenheit, vent terminals shall be a minimum of 3 inches in diameter, but in no event smaller than the required vent pipe. The change in diameter shall be made inside the building at least 1 foot below the roof and terminate not less than 12 inches above the roof, or as required by the administrative authority.

Climate-driven amendment

24.301.301 (1) (ad) Montana amendment

- 906.7 Frost or Snow Closure: Where frost or snow closure is likely to occur in locations having a minimum design temperature below zero degrees Fahrenheit, vent terminals shall be a minimum of 3 inches in diameter, but in no event smaller than the required vent pipe. The change in diameter shall be made inside the building at least 1 foot below the roof and terminate not less than 12 inches above the roof, or as required by the administrative authority.
- Climate-driven amendment

Montana amendment

24.301.301 (1) (ae) Montana amendment

- 908.1 Vertical Wet Venting.

Montana amendment

24.301.301 (1) (af) Montana amendment

- Probably means amend 908.1 (not 908.1.1)

- 908.1 Vertical Wet Vent. Wet venting is limited to drainage piping receiving discharge from the trap arm of one and two fixture unit fixtures that also serves as a vent for not to exceed four fixtures. All wet vented fixtures shall be within the same story; provided, further, that fixtures with a continuous vent discharging into a wet vent shall be within the same story as the wet vented fixtures.

Montana amendment

24.301.301 (1) (ag) Montana amendment

- Probably means amend 908.1.1 (not 908.1.2)

- 908.1.1 Size. The piping between any two consecutive inlet levels shall be considered a wet vented section. Each wet vented section shall be a minimum of one pipe size larger than the required minimum waste pipe size of the upper fixture or shall be one pipe size larger than the required minimum pipe size for the sum of the fixture units served by such wet vented section, whichever is larger, but in no case less than two inches.
• **908.2 Horizontal Wet Venting for a Bathroom Groups.** A bathroom group located on the same floor level shall be permitted to be vented by a horizontal wet vent where all of the conditions of Section 908.2.1 through 908.2.5 are met. **Bathroom group locations include private bathrooms, private patient hospital rooms, commercial toilet rooms with only one toilet, one lavatory and may include one floor drain.**

---

**906.6 Lead.**

*(See Table 1701.1)* *(See Chapter 17)*  Sheet lead shall comply with the following:

1. For safe pans – not less than 4 pounds per square foot (lb/ft²) (19 kg/m²) or 1/16 of an inch (1.6 mm) thick.
2. For flashings or vent terminals – not less than 3 lb/ft² (15 kg/m²) or 0.0472 of an inch (1.2 mm) thick.
3. Lead bends and lead traps shall be not less than 1/8 of an inch (3.2 mm) in wall thickness.

---

**911.0 Circuit Venting**

Substantially changed...

- Increased clarity
- New sub-sections added
- New verbiage
- Several section or sub-section re-numberings

---

**911.1 Circuit Vent Permitted.**

- A maximum of eight fixtures: floor-outlet water closets, showers, bathtubs, or floor drains connected to a horizontal branch shall be permitted to be circuit vented. Each fixture drain 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.
- Change from any 8 fixtures to 8 with trap arm in same elevational plane
- Specific mention of trap arm length
- Horizontal pipe identified as both drain & vent (dual-purpose pipe)
911.1 Circuit Vent Permitted (continued)

- **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.

- Does NOT prohibit wall-mounted fixtures
- Reinforces that all fixtures in a circuit vented group have trap arm in same elevational plane

---

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.

- New reference to Table 703.2

---

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.

- Reference to Table 703.2

---

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 and 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 fixture drain 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 permitted to serve as a fixture drain or fixture branch for a fixture located within the same branch interval as the circuit-vented horizontal branch. The discharge to a relief vent shall not exceed 4 fixture units. Fixtures discharging to a relief vent shall be one or two fixture unit fixtures but shall not exceed a total of 4 fixture units.
The vented section of the horizontal branch drain shall be uniformly sloped and not more than 1 inch per foot (83.3 mm/m). The entire length of the vented section of the horizontal branch shall be sized for the total drainage discharge to the branch according to Table 703.2.

"uniformly sloped" means no variations in slope

Reference to Table 703.2

Circuit-vented horizontal branches are permitted to be connected together. Each group of a maximum of eight fixtures shall be considered a separate circuit vent and shall be in accordance with Section 911.4.1.1 and Section 911.4.1.2.

Parallel horizontal circuit vented branches shall be permitted to connect on the same floor level. Each separate circuit-vented horizontal branch that is interconnected shall be sized independently in accordance with Section 911.4.

Two or more circuit vented systems continuous on the same horizontal branch shall be uniformly sized for the total discharge into the branch.

We will now take a brief overview of venting concepts...

A few changes to model code

No Montana amendments
1001.2
Where Required:

...The vertical distance between a fixture outlet and the trap weir shall be as short as practicable, but in no case shall the tailpiece from a fixture 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 one another 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.
Where it is determined by the AHJ 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, PDI G-101, or PDI GG-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 discharge 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, clubs, hotels, hospitals, sanitariums, factory or school kitchens located in areas of establishments where food is prepared, or other establishments where grease is introduced into the drainage system in quantities that can effect line stoppage or hinder sewage treatment or private sewage disposal systems…

1014.1
General.

• Previous “general” verbiage has been stricken

• Verbiage now clearly enumerates specific fixtures that shall discharge through a grease interceptor

1014.3.3
Design.

• Gravity grease interceptors shall be constructed in accordance with the applicable standard in Table 1701.1 Chapter 17 or the design approved by the AHJ.
1101.4

Material Uses.

• ...ABS and PVC DWV piping installations shall be installed in accordance with applicable standards referenced in Table 1701.1 (Chapter 17) 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. These tests shall comply with all requirements of the standards to include the sample size, both for width and length. Plastic pipe shall not be tested filled with water. Plastic piping installed in plenums shall be tested in accordance with 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.
Chapter 12
Fuel Gas Piping

- Deleted
- 24.301.301 (1) (ai) Chapter 12, Fuel piping is deleted and replaced with International Fuel Gas Code.

Chapter 13
HEALTH CARE FACILITIES...MEDICAL GAS & VACUUM SYSTEMS

- Several model code changes
- Significant re-numbering or re-location of sections & subsections
- Montana only adopts three portions

24.301.301 (1) (aj)
Health Care Facilities and Medical Gas and Vacuum Systems

- Chapter 13, Health Care and Medical Gas and Vacuum Systems, is deleted except for Subsections 1301.1, 1302.0 and 1303.0, Health Care Facilities. In lieu of Chapter 13, except for the subsections not deleted, the Department of Labor and Industry adopts and incorporates by reference the National Fire Protection Association’s Standard NFPA 99, 2018 edition, Chapters 1 through 5 and Chapter 15 for the exclusive use as a standard for the installation of medical gas and vacuum systems. The requirements for this rule shall not be construed as to replace or supersede any additional requirements for testing and certification of medical gas and vacuum systems, including independent third-party certification of systems, as may be applicable. NFPA 99 is a nationally recognized standard setting forth minimum standards and requirements for medical gas and vacuum systems. A copy of NFPA 99 may be obtained from the National Fire Protection Association at www.nfpa.org

1301.4
Where Required.

- Construction and equipment requirements shall be applied only to new construction and new equipment, except as modified in individual chapters sections of this chapter. [NFPA 99:1.3.2]

1302.1
Building Risk Categories.

- Activities, systems, or equipment shall be designed to meet Category 1 through Category 4 requirements, as detailed in this code chapter. [NFPA 99:4.1]
• The health care facility’s governing body shall establish the processes and operations that are planned for the health care facility. [NFPA 99:4.2.1]

• In this context, “operations” does **NOT** mean surgical procedures.

• The governing body shall conduct risk assessments and shall determine risk categories based on the character of the processes and operations conducted in the health care facility. [NFPA 99:4.2.1.1]

• Risk categories shall be classified by the health care facility’s governing body by following and documenting a defined risk assessment procedure. [NFPA 99:4.2.2]

• Where required by the Authority Having Jurisdiction (AHJ), the risk assessment shall be provided to the AHJ for review based on the character of the processes and operations conducted in the health care facility. [NFPA 99:4.2.2.1]

• A documented risk assessment shall not be required for **where** Category 1 is selected. [NFPA 99:4.2.3]

• The health care facility’s governing body or its designee shall establish the following areas in accordance with the type of patient care anticipated (see definition of patient care space in Chapter 2):
  - (1) Category 1 spaces
  - (2) Category 2 spaces
  - (3) Category 3 spaces
  - (4) Category 4 spaces [NFPA 99:1.3.4.1]
1302.3
Anesthesia.

• It shall be the responsibility of the health care organization facility's governing body to designate anesthetizing locations. [NFPA 99:1.3.4.3]

1302.4
Wet Procedure Locations.

• It shall be the responsibility of the health care facility's governing body to designate wet procedure locations. [NFPA 99:1.3.4.3]

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.

• These are PQ standards for Medical Gas installer (brazer); inspector and verifier

Chapter 14
Firestop Protection

• No model code changes

• No Montana amendments

Chapter 15
Alternate Water Sources For Nonpotable Applications

• Several model code changes

• No Montana amendments

• This chapter looks at:
  • Gray water
  • Reclaimed water
  • On-site treated water

1501.1.1
Allowable Use of Alternate Water.

• Where approved or required by the AHJ, alternate water sources [reclaimed (recycled) water, gray water, and on-site treated nonpotable water] shall be permitted to be used instead of potable water for the applications defined in this chapter.
Untreated wastewater that has not come into contact with toilet waste, kitchen sink waste, dishwasher waste or similarly contaminated sources. Gray water includes wastewater from bathtubs, showers, lavatories, clothes washers, and laundry tubs. Also, known as grey water, graywater, and greywater.

Nonpotable water provided by a water/wastewater utility that, as a result of tertiary treatment of domestic wastewater, meets requirements of the public health AHJ for its intended uses.

This is not on-site sourced (it comes from a treatment plant) water

Alternate water source systems shall be designed in accordance with this chapter by a licensed plumbing contractor or a registered design professional or a licensed person who demonstrates competency to design the alternate water source system as required by the AHJ. Components, piping, and fittings used in any alternate water source systems shall be listed.

An operation and maintenance manual for gray water and on-site treated non-potable 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 as determined by the AHJ for on-site non-potable water systems.

(4) Details on deactivating the system for maintenance, repair, or other purposes.
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 AHJ. 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 contains recommended water reuse guidelines to assist regulatory agencies to develop, revise, or expand alternate water source water quality standards.

1503.2.2
Division.

- The gray water system shall connect to the sanitary drainage system downstream of fixture traps and vent connections through an approved gray water diverter valve. 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.

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.
1505.12
Signs.

• Signs in rooms and water closet tanks in buildings using reclaimed (recycled) water shall be in accordance with Section 1501.9 and Section 1501.9.1.

Chapter 16
Nonpotable Rainwater Catchment Systems

• Several model code changes
• Significant relocation and re-numbering
• No Montana amendments

1601.2
System Design.

• Rainwater catchment systems shall be designed in accordance with this chapter by a person registered or licensed to perform plumbing design work or who demonstrate competency to design the rainwater catchment system as required by the AHJ plumbing contractor or a 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 (1136 L).

• (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.

System Design. (continued)

• The installation, construction, alteration, and repair of rainwater catchment systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, irrigation, industrial processes, water features, cooling tower makeup and other uses shall be approved by the AHJ. Rainwater catchment systems for collecting precipitation from rooftops shall comply with ARCSA/ASPE 63.
1603.4.2
Prohibited Discharges.

- Overflows and bleed-off pipes from roof-mounted equipment and appliances shall not discharge onto roof surfaces that are intended to collect rainwater without prior approval from the AHJ.

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 AHJ. In the absence of water quality requirements determined by the AHJ, the minimum treatment and water quality shall be in accordance with Table 1603.5.
- **Exception:** No treatment is required for rainwater used for subsurface or nonsprinklered surface irrigation where the maximum storage volume is less than 360 gallons (1136 L).
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.

In the event that a cross-connection is discovered, the following procedure, in the presence of the AHJ shall be activated immediately:

1. Rainwater catchment water piping to the building shall be shutdown at the meter, and the rainwater riser shall be drained.

Many changes
- New standards
- Updated standards (newer editions)
- Deleted standards (obsolete)

Do they or do they not apply?
- In general, an appendix must be specifically adopted otherwise it does not constitute part of the plumbing code
- Some unchanged – A, B, C, F, I & J
- Some essentially unchanged – D, E, G & H
- Three significantly changed – K, L & M
- One new – N “Impact of Water Temperature on the Potential for Scalding and Legionella Growth”
Appendix B
EXPLANATORY NOTES ON COMBINATION WASTE & VENT SYSTEMS
• Adopted by the State of Montana
• No changes to model code
• Pertains to chapter 9, Section 910.0 and sub-sections

Appendix C
ALTERNATE PLUMBING SYSTEMS
• Now adopted! Previously NOT adopted by the State of Montana
• A few, relatively minor changes to model code

Appendix D
SIZING STORM WATER DRAINAGE SYSTEMS
• Adopted by the State of Montana
• No changes to model code

Appendix E
MANUFACTURED/MOBILE HOME PARKS & RV PARKS
• NOT adopted by the State of Montana
• A few, relatively minor changes to model code

Appendix F
FIREFIGHTER BREATHING AIR REPLENISHMENT SYSTEMS
• NOT adopted by the State of Montana
• No changes to model code

Appendix G
SIZING OF VENTING SYSTEMS
• NOT adopted by the State of Montana
• Several relatively minor changes to model code
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<th>L 101.1</th>
<th>Applicability.</th>
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<td>The purpose of this appendix is to provide a comprehensive set of technically sound provisions that encourage sustainable practices and works towards enhancing the design and construction of plumbing systems that result in positive, long-term environmental impact. This appendix is not intended to circumvent public health, safety, and general welfare requirements of this code.</td>
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For the purposes of this code, the definitions in Section L 201.1 shall apply to this appendix.

Note distinction: Chapter 2 definitions apply to this Appendix, however, Appendix definitions do not necessarily apply to the rest of UPC...

Energy Star.
A joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy. Energy Star is a voluntary program designed to identify and promote energy-efficient products and practices.

Lavatory.
(1) A basin or vessel for washing. (2) A plumbing fixture, as defined by (1), especially for use in personal hygiene. Principally not used for laundry purposes and never used for food preparation, or utensils, in food services. (3) A fixture designed for the washing of hands and face. Sometimes called a wash basin.

Maintenance.
The upkeep of property or equipment by the owner of the property in compliance with the requirements of this appendix.

Metering Faucet. A self-closing faucet that dispenses a specific volume of water for each actuation cycle. The volume or cycle duration can be fixed or adjustable.

Self Closing Faucet. A faucet that closes itself after the actuation control mechanism is deactivated. The actuation or control mechanism can be mechanical or electronic.

Storage Tank. The central component of the rainwater, stormwater, or dry weather runoff catchment system. Also known as a cistern or rain barrel.
L 201.0
Definitions, (continued)

• WaterSense. A voluntary program of the U.S. Environmental Protection Agency, designed to identify and promote water-efficient products and practices.

L 301.2
Qualifications.

• Where permits are required, the AHJ shall have the authority to require contractors, installers, or service technicians to demonstrate competency. Where determined by the AHJ, the contractor, installer, or service technician shall be licensed to perform such work.

L 302.1
Disposal.

• It shall be unlawful for a person to cause, suffer, or permit the disposal of sewage, human excrement, or other liquid wastes, in a place or manner, except through and by means of an approved drainage system, installed and maintained in accordance with the provisions of this code.

L 302.2
Connections to Plumbing System Required.

• Equipment and appliances, used to receive or discharge liquid wastes or sewage, shall be connected properly to the drainage system of the building or premises, in accordance with the provisions of this code.

L 303.1
General.

• An abandoned system or part thereof covered under the scope of this appendix shall be disconnected from remaining systems, drained, plugged, and capped in an approved manner.

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**L 401.0 Water Conservation and Efficiency**

**L 401.1 Scope.**

- The provisions of this section establish the means of conserving potable and nonpotable water in and around a building.

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**L 402.0 Water Conserving Plumbing Fixtures and Fittings.**

- L 402.2 Water Closets.
- L 402.3 Urinals.
- L 402.4 Residential Kitchen Faucets.
- L 402.5 Lavatory Faucets.
- L 402.6 Showerheads.
- L 402.7 Recirculating Shower Systems.
- L 402.8 Commercial Pre-Rinse Spray Valves.
- L 402.9 Emergency Safety Showers and Eye Wash Stations.
- L 402.10 Drinking Fountains.

---

**L 402.2 Water Closets.**

- 1.28 Gallons (4.8 Lpf) maximum
- The effective flush volume for dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.
- This applies to both tank-type and flushometer operated WC's

---

**L 402.3 Urinals.**

- .5 Gallons (1.9 Lpf) maximum for “flush” type fixtures
- H.E.U.'s may use as little as one pint and qualify for LEED points

---

**1.28 gpf Toilet**

- WaterSense
- Meets EPA Criteria
- 1.28 gpf (4.8 Lpf)

---

**L 402.3 Urinals. (continued)**

- Nonwater urinals:
  - Require roughed-in waterline
  - Not less than one water-supplied, 1 DFU fixture upstream
- Question?
  - Is the roughed in waterline a “dead end”?
L 402.4
Residential Kitchen Faucets.

• Shall not exceed 1.8 gpm @ 60 psi

L 402.5
Lavatory Faucets.

• L 402.5.1 …Residences, Apartments, & Private Baths…
  • Shall not exceed 1.5 gpm @ 60 psi
  • Listed to EPA WaterSense HE Lavatory Faucet Specification

• L 402.5.2 …other than “Residential (above)
  • (1) Shall not exceed .5 gpm @ 60 psi
  • (2) Metering faucets shall deliver not more than 0.25 gallons of water per cycle

L 402.6
Showerheads.

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

Saving water…

Packages.

• WaterSense listed items

• Showerhead is rated 1.8 gpm

• KS swivel aerator 1.5 gpm

• Lavatory aerators 1.0 gpm

L 402.6.1
Multiple Showerheads Serving One Shower Compartment.

• The total allowable flow rate of water from multiple showerheads flowing at a given time, with or without diverters, including rain systems, waterfalls, body sprays, and jets, shall not exceed 2.0 gpm per shower compartment, where the floor area of the shower compartment is less than 1800 square inches (1.161 m²). For each increment of 1800 square inches (1.161 m²) of floor area after that or part thereof, additional showerheads are allowed, provided the total flow rate of water flowing from the devices shall not exceed 2.0 gpm (7.6 L/m) for each such increment.
L 402.6.1
Exceptions:

• (1) Gang showers in nonresidential occupancies. Singular showerheads of multiple shower outlets serving one showering position in gang showers shall have not more than 2.0 gpm (7.6 L/m) total flow.

• (2) Where provided, shower compartments required for persons with disabilities in accordance with Chapter 17 shall not have more than 4.0 gpm (15 L/m) total flow, where one outlet is the hand shower.

L 402.6.1
Observations: Multiple Showerheads Serving One Shower Compartment.

• 1800 Sq. in. = area of typical bathtub (30" x 60")
• Each increment is permitted 2.0 gpm flow at any given time
• If increased to 1801 square inches, one could have two x 2.0 gpm "outlets" operating at one time
• Just because one is limited to 2.0 maximum at any one time, does **NOT** mean there cannot be more than one 2.0 gpm "outlet", rather it means that only 2.0 gpm are allowed at one time...

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.

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 tested at 2.0 gpm (7.6 L/m).
L 403.1
Dishwashers.

• Residential and commercial dishwashers shall comply with Energy Star program requirements.

L 403.2
Clothes Washers.

• Residential clothes washers shall comply with the Energy Star program requirements. Commercial clothes washers shall comply with Energy Star program requirements, where such requirements exist.

L 404.2
Ice Makers.

• Ice makers shall be air cooled and shall be in accordance with Energy Star for commercial ice machines.

L 404.3
Food Steamers.

• Boilerless type steamers shall consume not more than 2.0 gallons (7.6 L) per compartment. Boiler type steamers shall consume not more than 1.5 gallons (5.7 L) per pan per hour.

L 404.5
Grease Interceptors.

• Grease interceptor maintenance procedures shall not include post-pumping/cleaning refill using potable water. Refill shall be made by connected appliances accumulated discharge only.
Dipper Wells.

• Where dipper wells are installed, the water supply to a dipper well shall have a shutoff valve and flow control. The flow of water into a dipper well shall be limited by 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/min) at a supply pressure of 60 psi (414 kPa). The water capacity of the 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/min) at a supply pressure of 60 psi (414 kPa).

Food Waste Disposers.

• The water use for the food waste grinder shall not exceed 8 gpm (30.3 L/min) under full load condition and 1 gpm (3.8 L/min) under no-load condition. Flow restrictors shall be installed on the water supply to limit the water flow rate to a maximum of 8 gpm (30.3 L/min). A load sensing device shall be installed to monitor current demand and regulate water flow.

Use of Alternate Water Source for Special Water Features.

• Special water features such as ponds and water fountains shall be provided with reclaimed (recycled) water, rainwater, or on-site treated nonpotable water where the source and capacity are available on the premises and approved by the AHJ.

Meters Required.

• A water meter shall be required for buildings connected to a public water system, including municipally supplied reclaimed (recycled) water. In other than single-family houses, multifamily structures of three or fewer stories above grade, and modular houses, a separate meter or submeter shall be installed in the following locations:
  • There are six (6) specific locations that follow…
L 411.0
Landscape Irrigation Systems.

• L 411.2 Backflow Protection.
• L 411.3 Use of Alternate Water Sources for Landscape Irrigation.
• L 411.4 Irrigation Control Systems.
• L 411.5 Low Flow Irrigation.
• L 411.10 Sprinkler Head Installation.
• L 411.12 Depth of Irrigation Pipe.

L 411.4
Irrigation Control Systems.

• Where installed as part of a landscape irrigation system, irrigation controls shall:
  • (1) Automatically adjust the irrigation schedule to respond to plant water needs determined by weather or soil moisture conditions.
  • (2) Utilize sensors to suspend irrigation during rainfall.
  • (3) Utilize sensors to suspend irrigation where adequate soil moisture is present for plant growth.
  • (4) Have the capability to program multiple and different run times for each irrigation zone to enable cycling of watering applications and durations to mitigate water flowing off of the intended irrigation zone.

L 411.5
Low Flow Irrigation.

• Where installed as part of a landscape irrigation system, irrigation controls shall:
  • (5) 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 number of cycles to mitigate runoff and monthly adjustments or percentage.
L 411.10.3
Where pop-up type sprinkler heads are installed, the sprinkler heads shall rise to a height above vegetation level and of not less than 4 inches (102 mm) above the soil level where emitting water.

L 411.12
Depth of Irrigation Pipe.
• Irrigation pipe downstream from the backflow preventer shall be buried at a minimum depth according to Section L 411.12.1 and Section 411.12.2.

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 IAPMO PS 76.
• L 412.2 Drainage Type Trap Seal Primer Devices. Drainage type trap seal primer devices shall not be limited in the amount of water they discharge.

L 501.0
• L 501.1 Scope. The provisions of this section shall establish the means of conserving potable and nonpotable water and the energy associated with generation and use of hot water in a building. This includes provisions for the hot water distribution system between a water heating device and the plumbing fixtures, including dedicated return piping and appurtenances to the water heating device in a recirculation system.
• Hot water supply piping and return piping shall be thermally insulated. The wall thickness of the insulation shall be equal to the nominal diameter of the pipe up to two inches (50 mm). The wall thickness shall be not less than 2 inches (51 mm) for nominal pipe diameters exceeding two inches (50 mm).…

Insulation.

Solar Water Heating…

L 504.1 General. The erection, installation, alteration, addition to, or maintenance of solar water heating systems shall be in accordance with this section and the Uniform Solar Energy and Hydronics Code.

Hot Water
Extensive section…

• Due to interconnection of conservation, water & energy this section is large

• We will not go into detail…

L 506.0
Drain Water Heat Exchangers.

• L 506.1 General. Drain water heat exchangers shall comply with IAPMO PS 92. The heat exchanger shall be accessible.

L 602.0
Qualifications.

• L 602.1 General. Where permits are required the AHJ shall have the authority to require contractors, installers, or service technicians to demonstrate competency. Where determined by the AHJ, the contractor, installer, or service technician shall be licensed to perform such work.
**Appendix M**

**PEAK WATER DEMAND CALCULATOR**

- Entirely new in 2018, however with 2021 adopted by Montana
- Absolute innovation! 1st substantial update to water sizing in 80 years!
- HUGE implications for:
  - Pipe sizing
  - Water conservation

**Why Appendix M?**

What drove this initiative?

- Plumbing fixture water demand changed drastically over time.
- Dr. Hunter’s world:
  - Water Closets – 6-8 gallons per flush
  - “Water conserving fixtures” were unheard of and unthought of…
  - Flush and forget mentality virtually ubiquitous!
- Today:
  - Water Closets – as low as .6 gallons per flush!
  - Water conservation is the norm everywhere
  - Infrastructure that was aging in Dr. Hunter’s era is ancient and failing catastrophically!

**IAPMO Engagement:**

Leader in innovation and collaboration…

- Convener of Emerging Water Technology Symposium (EWTS)
- Partnered with Plumbing’s pre-eminent thought leaders:
  - Alliance for Water Efficiency
  - American Society of Plumbing Engineers
  - Plumbing Manufacturers International
  - World Plumbing Council
- “Last Mile” studies – less liquid goes down the drain, how does sewage get to the wastewater treatment plant?

**Implications of pipe sizing… is bigger really better?**

Consider:

- Cost of pipe & fittings
- Potable water wasted
- Watergy = “Interconnection of water and energy”
- Efficiency of potable water distribution systems
- Public health – reducing harborage of Legionella bacteria

**M101.1**

Applicability.

- This appendix provides a method for estimating the demand load for the building water supply and principal branches for single and multi-family dwellings with water-conserving fixtures, fixtures fittings, and appliances.
Plumbing fixtures, fixture fittings and appliances shall not exceed the design flow rate in Table M102.1.

Water-Conserving Fixtures.

Water Demand Calculator.

The estimated design flow rate for the building supply and principal branches and risers shall be determined by the IAPMO Water Demand Calculator available for download at:

http://www.iapmo.org/WEStand/Pages/WaterDemandCalculator.aspx

Water Demand Calculator.

To determine the design flow rate for the building supply and principal branches and risers, enter the total number of indoor plumbing fixtures and appliances for the building in Column [B] of the Water Demand Calculator and run Calculator. See Table M 102.3 for an example.

Meter and Building Supply.

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

Fixture Branches and Fixture Supplies.

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

Continuous Supply Demand.

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

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

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Except as provided in Section M102.0 for estimating the demand load for single- and multi-family dwellings, the size of each water piping system shall be determined in accordance with the procedure set forth in Appendix A. After determining the permissible friction loss per 100 feet (30.480 mm) of pipe in accordance with Section A 104.0 and the demand flow in accordance with the Water Demand Calculator, the diameter of the building supply pipe, branches and risers shall be obtained from Chart A 105.1(1) through Chart A 105.1(7), whichever is applicable, in accordance with Section A 105.0 and Section A 107.0. Appendix I (IS 31), Figure 3 and Figure 4 shall be permitted when sizing PEX systems.

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The minimum fixture branch size shall be ½ inch (15 mm) in diameter.

**Note**: fixture branch and fixture supply are NOT the same!

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Provides several examples:

1. Find Demand Load for Building Supply.
2. Determine the Pipe Size of the Building Supply.
3. Indoor, Outdoor and Other Fixtures Water Use.
4. Sizing Branches and Risers
CDC reports:
Hospitals at significant risk...

- Legionella in hospitals accounted for 57% of all cases and 88% of deaths

Potable Water versus Utility (Cooling Towers)

Statistics

- Potable water was the most frequent source of exposure at 56% followed by cooling towers at 22%
- Potable water sources accounted for 67% of health-care associated outbreaks in hospitals and long-term care facilities

Other sources

Less common, however, real...

- Spas and hot tubs
- Misters
- Grocery store produce counters, etc.
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 AHJ.

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.

Cold Water. Water at a temperature of less than 77°F (25°C).

Tepid Cold Water. Water at a temperature not less than 77°F (25°C) and less than 85°F (29°C).

Tepid Water. Water at a temperature not less than 85°F (29°C) and less than 110°F (43°C).

Warm Water. Water at a temperature not less than 110°F (43°C) and less than 120°F (49°C).

Tempered Hot Water. Water at a temperature not less than 120°F (49°C) and less than 130°F (54°C).

Hot Water. Water at a temperature not less than 130°F (54°C) and less than 140°F (60°C).

Very Hot Water. Water at a temperature not less than 140°F (60°C) and less than 160°F (71°C).

Disinfecting Hot Water. Water at a temperature not less than 160°F (71°C).

Legionella Growth Potential. The likelihood that Legionella bacteria will reproduce.

Scald Potential. The likelihood of burning the skin.

Construction documents shall be required for new construction, renovation, refurbishment, replacement, or repurposing of an occupiable building water system and shall be submitted to the AHJ.

The AHJ 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 that pose a Legionella growth potential.
Where the water distribution system’s water temperature(s) range poses a scald potential in accordance with Table 104.1, protection shall be provided in accordance with Chapter 4.

Scald Potential.

Where required by the AHJ, 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, 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:

1. Copper-silver ionization methods and procedures including the following documentation:
   a. Copper and silver ionization concentrations shall be included in the documentation.
   b. Methods and documentation for monitoring ion levels.
   c. Electrode cleaning cycles and methods shall be reported.

2. Ultraviolet light methods shall include the following documentation:
   a. Location of ultraviolet light units.
   b. Cleaning cycles and methods of the quartz sleeves and housing shall be documented.