2024 UPC Chapter 15

and Appendix L

2024 UPC Alternate/Sustainable
2025 Spring
Montana EduCode

Presented By:
Jed Scheuermann

IAPMO®
TRAINING & EDUCATION
seminars@iapmo.org | www.iapmo.org | www.iapmolearn.org

Environmental Note:

In consideration of the environment, this handout has been designed to conserve printing supplies and paper.

Contact:

IAPMO Training and Certification Department at:
Chicago Regional Office
18927 Hickory Creek Dr., Suite 220
Mokena, IL 60448-8399
Email: seminars@iapmo.org
Toll free: 1-877-427-6601

Have a code question, get your answers here:

https://www.iapmo.org/codes-standards-development/code-development/ask-a-code-question/

Copyright:

Image Disclaimer:

The graphics and illustrations used in this course are presented for educational purposes only. IAPMO does not endorse or recommend the vendor/product depicted, nor any vendor or product. IAPMO makes no representations, warranties or guarantees as to, and assumes no responsibility for, the product(s) depicted and IAPMO expressly disclaims all liability for damages of any kind arising out of the use or performance of the vendors, products or services depicted.

Content Disclaimer

The information herein is provided for educational purposes only and shall not be treated as an official interpretation of the referenced codes or standards. Always refer to the complete code or standard when installing, replacing, or repairing any plumbing or mechanical system.

This class…
…our approach

- Relevant portions of other UPC chapters or Water Efficiency and Sanitation Standard for the Built Environment (WEStand)
- Chapter 15 – Alternate Water Sources For Nonpotable Applications
- Appendix L – Sustainable Practices

Water Reuse
Essential, not optional!

> "… just something as simple as a toilet and having to have a robust toilet that not only functions as a toilet but allows you to recycle the water from your urine and deal with the feces in a hygienic way… we are recovering about 95% of the water in urine right now… that water goes right back into our galley…"
>
> Don Petit, NASA astronaut, Silverton, OR

Chapter 2

Definitions
203.0

Accepted Engineering Practice
That which conforms to technical or scientific-based principles, tests, or standards that are accepted by the engineering profession.

Alternate Water Source
Nonpotable source of water that includes but not limited to gray water, on-site treated nonpotable water, rainwater, and reclaimed (recycled) water.

205.0

Cross-Connection
A connection or arrangement, physical or otherwise, between a potable water supply system and a plumbing fixture or tank, receptor, equipment, or device, through which it may be possible for nonpotable, used, contaminated water, or other substances to enter into a part of such potable water system under any condition.

206.0

Diverter Valve, Gray Water
A valve that directs gray water to the sanitary drainage system or a subsurface irrigation system.

Diverter Valve, On-Site Treated Nonpotable Water
A component in the collection system to control inflow and overflow in collection tanks intended for on-site treatment and direct beneficial use.

209.0

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

215.0
Mulch
Organic materials, such as wood chips and fines, tree bark chips, and pine needles that are used in a mulch basin to conceal gray water outlets and permit the infiltration of gray water.

Mulch Basin
A subsurface catchment area for gray water that is filled with mulch and of sufficient depth and volume to prevent ponding, surfacing, or runoff.

217.0
On-site Treated Nonpotable Water
Nonpotable water, including gray water that has been collected, treated, and intended to be used on-site and is suitable for direct beneficial use.

218.0
Potable Water
Water that is satisfactory for drinking and culinary, and domestic purposes and that meets the requirements of the Health Authority Having Jurisdiction.

220.0
Reclaimed Water
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.

Registered Design Professional
An individual who is registered or licensed by the laws of the state to perform such design work in the jurisdiction.

221.0
Subsoil Irrigation Field
Gray water irrigation field installed in a trench within the layer of soil below the topsoil. This system is typically used for irrigation of deep rooted plants.

Subsurface Irrigation Field
Gray water irrigation field installed below finished grade within the topsoil

Surge Tank
A reservoir to modify the fluctuation in flow rates to allow for uniform distribution of gray water to the points of irrigation.

225.0
Water-Conditioning or Treating Device
A device that conditions or treats a water supply to change its chemical content or remove suspended solids by filtration.

Water/Wastewater Utility
A public or private entity which may treat, deliver or do both functions to reclaimed (recycled) water, potable water, or both to wholesale or retail customers.

Chapter 3 General Regulations

Parts
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…

Counterfeits
Bootleg products
- Marks of conformity are valuable
- Listing costs $
- Unscrupulous companies sell unlisted products

Engineering
301.5 Alternative Engineered Design
- An alternative engineered design shall comply with the intent of the provisions of this code and shall provide an equivalent level of quality, strength, effectiveness, fire resistance, durability, and safety. Material, equipment, or components shall be designed and installed in accordance with the manufacturer's installation instructions.

Workmanship
309.1 Engineering Practices
- Design, construction, and workmanship shall be in accordance with accepted engineering practices and shall be of such character as to secure the results sought to be obtained by this code.

Workmanship
309.4 Installation Practices
- Plumbing systems shall be installed in a workmanlike manner which is in accordance with this code, applicable standards, and manufacturer's installation

instructions. All materials shall be installed so as to not adversely affect the systems and equipment or the structure of the building, and in compliance with all laws and other provisions of this code. All plumbing systems shall be in accordance with construction documents approved by the AHJ.

Chapter 6 - Water Supply and Distribution

Piping Identification

601.3 Identification of a Potable and Nonpotable System

In buildings where potable and nonpotable systems are installed, each system shall be clearly identified in accordance with Section 601.3.1 through Section 601.3.5.

601.3.2 Color and Information

Each system shall be identified with a colored pipe or band and coded with paints, wraps, and materials compatible with the piping… The background color and required information shall be indicated every 20 feet but not less than once per room, and shall be visible from the floor level.

601.3.3 Alternate Water Sources

Alternate water source systems shall have a purple (Pantone color No. 512, 522C, or equivalent) background with uppercase lettering and shall be field or factory marked as follows:

(1) Gray water systems… “CAUTION: NONPOTABLE GRAY WATER, DO NOT DRINK”
(2) Reclaimed (recycled) water… “CAUTION: NONPOTABLE RECLAIMED (RECYCLED) WATER, DO NOT DRINK”
(3) On-site treated water… “CAUTION: on-site treated NONPOTABLE WATER, DO NOT DRINK”
(4) Rainwater catchment water… “CAUTION: NONPOTABLE RAINWATER, DO NOT DRINK”

Identification

601.3.5 Outlets

Each outlet on the non-potable water line that is used for special purposes shall be posted with black uppercase lettering as follows: “CAUTION: NONPOTABLE WATER, DO NOT DRINK.”

Chapter 15 Alternate Water Sources for Nonpotable Applications

Alternate sources…

- **Deals with:**
  - Reclaimed (recycled) water
  - Gray water
  - On-site treated water
- **Does not deal with "Rainwater"**
  - Addressed in Chapter 16 & Appendix K

General

1501.1.1 Allowable Use of Alternate Water

Where approved 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 identified in this chapter.

1501.2 System Design

Alternate water source systems shall be designed in accordance with this chapter by a licensed plumbing contractor or a registered design professional. Components, piping, and fittings used in any alternate water source system shall be listed.

Exceptions: …maximum discharge of 250 gal/d…

(1) … gray water systems for SFR & multi-family

(2) … on-site treated nonpotable water for SFR

1501.5 Maintenance and Inspection

Alternate water source systems and components shall be inspected and maintained in accordance with Table 1501.5 unless more frequent inspection and maintenance are required by the manufacturer.

- … Maintenance log…
- … Responsibility of property owner…

1501.6 Operation and Maintenance Manual

1) Detailed diagram of the entire system and the location of system components.

2) Instructions for operating and maintaining the system.

3) Details on maintaining the required water quality for onsite nonpotable water systems.

4) Details on deactivating the system for maintenance, repair, or other purposes.

5) Applicable testing, inspection, and maintenance frequencies in accordance with Table 1501.5.

6) A method of contacting manufacturer(s).

1501.7 Minimum Water Quality Requirements
… In the absence of water quality requirements, for on-site treated non-potable 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. …
NSF 350 “Onsite Residential & Commercial Water Reuse Treatment Systems”

1501.8 Material Compatibility
Alternate water source systems shall be constructed of materials that are compatible with the type of pipe and fitting materials, water treatment, and water conditions in the system.

1501.9 Commercial, Industrial and Institutional Restroom Signs
A sign shall be installed in restrooms in commercial, industrial, and institutional occupancies using reclaimed (recycled) water and on-site treated water, for water closets, urinals, or both. Each sign shall contain ½ of an inch letters of a highly visible color on a contrasting background. The location of the sign(s) shall be approved by the AHJ and shall contain the following text:

> TO CONSERVE WATER, THIS BUILDING USES *_____* TO FLUSH TOILETS AND URINALS.
>
> *_____* Shall indicate RECLAIMED (RECYCLED) WATER or ON-SITE TREATED WATER, accordingly.

1501.9.1 Equipment Room Signs
Each room containing reclaimed (recycled) water and on-site treated water equipment shall have a sign posted in a location that is visible to anyone working on or near nonpotable water equipment with the following wording in 1 inch letters:

> CAUTION: NOPOTABLE *_____*, DO NOT DRINK. DO NOT CONNECT TO DRINKING WATER SYSTEM. CONTACT BUILDING MANAGEMENT BEFORE PERFORMING ANY WORK ON THIS WATER SYSTEM.

1502.3 Annual Cross-Connection Inspection and Testing
An initial and subsequent annual inspection and test shall be performed on both the potable and alternate water sources systems. The potable and alternate source system shall be isolated from each other and independently inspected and tested to ensure there is no cross-connection in accordance with Section 1502.3.1 through Section 1502.3.4.

> This section & its sub-sections also apply to gray, reclaimed (recycled), and on-site treated water systems.

Annual Cross-Connection Inspection and Testing

- 1502.3.1 Visual System Inspection.
- 1502.3.2 Cross-Connection Test.
- 1502.3.3 Discovery of Cross-Connection.
- 1502.3.4 Annual Inspection.

1502.4 Separation Requirements

Underground alternate source water service piping other than gray water shall be separated from the building sewer in accordance with this code. Treated nonpotable water pipes shall be permitted to be run or laid in the same trench as potable water pipes with a 12 inch minimum vertical and horizontal separation where both pipe materials are approved for use within a building. Where horizontal piping materials do not comply with this requirement, the minimum separation shall be increased to 60 inches. The potable water piping shall be installed at an elevation above the treated nonpotable water piping.

1502.5 Abandonment and sub-sections

Systems to be properly maintained or abandoned

- Disconnected
- Drained
- Plugged & capped
- Underground tank filled:
  - Earth, sand, gravel, concrete, etc.
- Includes ***ALL*** piping, components & storage

1502.6 Sizing

Unless otherwise provided for in this chapter, alternate source water piping shall be sized in accordance with Chapter 6 for sizing potable water piping.

- 610.4 provides basic methodology
- 610.5 references Appendices A & C
- Appendix M is another method, provided it is adopted

Balance of Chapter 15

- **1503.0 & 1504.0** & sub-sections = Gray water
- **1505.0** & sub-sections = Reclaimed (recycled) water
- **1506.0** & sub-sections = On-site water

1503.2 System Requirements

Gray water shall be permitted to be diverted away from a sewer or private sewage disposal system, and discharge to a mulch basin for single and multi-family dwellings. Gray water shall not be used to irrigate root crops or food crops intended for human consumption that comes in contact with soil.

1503.2.1 Surge Capacity

Gray water systems shall be designed to have the capacity to accommodate peak flow rates and distribute the total amount of estimated gray water on a daily basis to a subsurface irrigation field, subsoil irrigation field, or mulch basin without surfacing, ponding, or runoff. A surge tank is required for systems that are unable to accommodate peak flow rates and distribute the total amount of gray water by gravity drainage. The water discharge for gray water systems shall be determined in accordance with Section 1503.8.1 or Section 1503.8.2.

1503.2.2 Diversion

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

1503.3 Connections to Potable/Reclaimed (Recycled) Water Systems

Gray water systems shall have no direct connection to a potable water supply, on-site treated nonpotable water supply, or reclaimed (recycled) water systems. Potable, on-site treated nonpotable, or reclaimed (recycled) water is permitted to be used as makeup water for a non-pressurized storage tank *provided the connection is protected by an air gap* in accordance with this code.

Table 1503.4 Location
Minimum distance required to other facilities…

TABLE 1503.4
LOCATION OF GRAY WATER SYSTEM[7]

MINIMUM HORIZONTAL DISTANCE IN CLEAR REQUIRED FROM	SURGE TANK (feet)	SUBSURFACE AND SUBSOIL IRRIGATION FIELD AND MULCH BED (feet)
Building structures[1]	5[2, 9]	2[3, 8]
Property line adjoining private property	5	5[8]
Water supply wells[4]	50	100
Streams and lakes[4]	50	50[5]
Sewage pits or cesspools	5	5
Sewage disposal field[10]	5	4[6]
Septic tank	0	5
On-site domestic water service line	5	5
Pressurized public water main	10	10[7]

For SI units: 1 foot = 304.8 mm

Table 1503.4 Footnotes

Notes:

1. Including porches and steps, whether covered or uncovered, breezeways, roofed carports, roofed patios, carports, covered walks, covered driveways, and similar structures or appurtenances.
2. The distance shall be permitted to be reduced to 0 feet for aboveground tanks where first approved by the Authority Having Jurisdiction.
3. Reference to a 45 degree (0.79 rad) angle from the foundation.
4. Where special hazards are involved, the distance required shall be increased as directed by the Authority Having Jurisdiction.
5. These minimum clear horizontal distances shall apply between the irrigation or disposal field and the ocean mean higher high tide line.
6. Add 2 feet (610 mm) for each additional foot of depth more than 1 foot (305 mm) below the bottom of the drain line.
7. For parallel construction or crossings, approval by the Authority Having Jurisdiction shall be required.
8. The distance shall be permitted to be reduced to 1½ feet (457 mm) for drip and mulch basin irrigation systems.
9. The distance shall be permitted to be reduced to 0 feet for surge tanks of 75 gallons (284 L) or less.
10. Where irrigation or disposal fields are installed in the sloping ground, the minimum horizontal distance between a part of the distribution system and the ground surface shall be 15 feet (4572 mm).

1503.6 Prohibited Location
Where there is insufficient lot area or inappropriate soil conditions for adequate absorption to prevent the ponding, surfacing, or runoff of the gray water, as determined by the AHJ, no gray water system shall be permitted. A gray water system is not permitted on a property in a geologically sensitive area as determined by the AHJ. Who is this "AHJ" in this situation?

1503.7 Drawings and Specifications
The AHJ shall require the following information to be included with or in the plot plan before a permit is issued for a gray water system, or at the time of construction thereof:

(1) …drawn to scale and completely dimensioned…
(2) Details of construction…
(3) Details for holding tanks…
(4) A log of soil formations… water absorption characteristics of soil at proposed site…
Exception: …permit the use of Table 1504.2…
(5) Distance between the plot and surface water…

Table 1504.2 Soil types…

TABLE 1504.2
DESIGN OF SIX TYPICAL SOILS

TYPE OF SOIL	MINIMUM SQUARE FEET OF IRRIGATION AREA PER 100 GALLONS OF ESTIMATED GRAY WATER DISCHARGE PER DAY	MAXIMUM ABSORPTION CAPACITY IN GALLONS PER SQUARE FOOT OF IRRIGATION/ LEACHING AREA FOR A 24-HOUR PERIOD
Coarse sand or gravel	20	5.0
Fine sand	25	4.0
Sandy loam	40	2.5
Sandy clay	60	1.7
Clay with consider-able sand or gravel	90	1.1
Clay with small amounts of sand or gravel	120	0.8

For SI units: 1 square foot = 0.0929 m^2, 1 gallon per day = 0.000043 L/s

1503.8 Procedure for Estimating Gray Water Discharge
Gray water systems shall be designed to distribute the total amount of estimated gray water on a daily basis. The water discharge for gray water systems shall be determined in accordance with Section 1503.8.1 or Section 1503.8.2.

1503.8.1 Single-Family Dwellings & Multi-Family Dwellings
The gray water discharge for single family and multi-family dwellings shall be calculated by water use records, calculations of local daily per person interior water use, or the following procedure:

1503.8 sub-sections Procedure for Estimating Gray Water Discharge
SFR & Multifamily Dwellings.
(1) Occupants:
1st bedroom = 2
Additional bedrooms = 1
(2) Gray water:
Showers, bathtubs & lavatories = 25gpd/occupant
Laundry = 15gpd/occupant
(3) # of occupants (1) X gpd (2)

1503.8.2 Commercial, Industrial, and Institutional Occupancies
The gray water discharge for commercial, industrial, and institutional occupancies shall be calculated by utilizing the procedure in Section 1503.8.1, water use records or other documentation to estimate gray water discharge.

1503.9.1 Surge Tanks
Where installed, surge tanks shall be in accordance with the following:
(1) …solid, durable materials not subject to excessive corrosion or decay and shall be watertight… steel shall be approved by the AHJ…
(2) …vented… based on the total gray water fixture units…
(3) …access opening with lockable gasketed covers…
(4) …rated capacity permanently marked… sign stating GRAY WATER, DANGER – UNSAFE WATER…
(5) …overflow drain… permanent connections to building drain or building sewer… [no] shutoff valve…
(6) …overflow drainpipes shall not be less in size than the inlet pipe. Unions or equally effective fittings shall be provided…
1503.9.1 continued
Surge Tanks
(7) …structurally designed to withstand anticipated earth or other loads… covers capable of withstanding an earth load of 300psf where tank is designed for underground installation.
(8) …underground, the system shall be designed so that the tank overflow will gravity drain to the existing sewer… protected against sewer line backflow by a backwater valve…
(9) …on dry, level, well-compacted soil where underground… on a level 3 inch thick concrete slab where aboveground…
(10) …anchored to prevent against overturning, where installed aboveground… underground… ballasted, anchored, or otherwise secured, to prevent the tank from floating out of the ground where empty… combined weight of tank and hold down system shall meet or exceed buoyancy forces of the tank.

1503.9.3 Materials
Aboveground and underground building drainage and vent pipe and fittings for gray water systems shall comply with the requirements for aboveground and underground sanitary building drainage and vent pipe and fittings in this code. These materials shall extend not less than 2 feet outside the building.
See Chapters 7 & 9

1503.9.3 Subsoil Irrigation Field Materials
Subsoil irrigation field piping shall be constructed of perforated high-density polyethylene pipe, perforated ABS pipe, perforated PVC pipe, or other approved materials, provided sufficient openings are available for distribution of gray water into the trench area. Material, construction, and perforation of the pipe shall be in accordance with the appropriate absorption field drainage piping standards and shall be approved by the AHJ.

1503.9.4 Subsurface Irrigation Field/Mulch Basin Supply Line Materials
Materials for gray water piping outside the building shall be polyethylene or PVC. Drip feeder lines shall be PVC or polyethylene tubing.

1503.9.5 Valves. Valves shall be accessible.

1503.9.6 Trap
Gray water piping discharging into the surge tank or having a direct connection to the sanitary drain or sewer piping shall be downstream of an approved water seal type trap(s). Where no such trap(s) exists, an approved vented running trap shall be installed upstream of the connection to protect the building from possible waste or sewer gases

1503.9.7 Backwater Valve
A backwater valve shall be installed on gray water drain connections to the sanitary drain or sewer.

1504.2 Required Area of Subsurface Irrigation Fields…
The minimum effective irrigation area of subsurface irrigation fields, subsoil irrigation fields, and mulch basins shall be determined by Table 1504.2 for the type of soil found in the excavation, based upon a calculation of estimated gray water discharge under Section 1503.8. For a subsoil irrigation field, the area shall be equal to the aggregate length of the perforated pipe sections within the valved zone multiplied by the width of the proposed subsoil irrigation field.

1504.3 Determination of Maximum Absorption Capacity
The irrigation field and mulch basin size shall be based on the maximum absorption capacity of the soil and determined using Table 1504.2. For soils not listed in Table 1504.2, the maximum absorption capacity for the proposed site shall be determined by percolation tests or another method acceptable to the AHJ. A gray water system shall not be permitted, where the percolation test shows the absorption capacity of the soil is unable to accommodate the maximum discharge of the proposed gray water irrigation system.

1504.4 Groundwater Level
No excavation for an irrigation field, disposal field, or mulch basin shall extend within 3 feet vertical of the highest known seasonal groundwater level, nor to a depth where gray water contaminates the groundwater or surface water. The applicant shall supply evidence of groundwater depth to the satisfaction of the AHJ.

1504.5 and sub-sections
Subsurface & Subsoil Irrigation Field Design & Construction

1504.5.2 Minimum Depth. Supply piping, including drip feeders, shall be not less than 2 inches below finished grade and covered with mulch or soil.

1504.5.3 Filter. Not less than 140 mesh (105 microns) filter with a capacity of 25gpm or equivalent shall be installed. Where a filter backwash is installed, the backwash and flush discharge shall discharge into the building sewer or private sewage disposal system. Filter backwash and flush water shall not be used.

1504.5.4 Emitter Size
Emitters shall be installed in accordance with the manufacturer's installation instructions. Emitters shall have a flow path of not less than 1200 microns (μ) (1200 μm) and shall not have a coefficient of manufacturing exceeding 7 percent. Irrigation system design shall be such that emitter flow variation shall not exceed 10 percent.

1504.5.5 & 1504.5.6 Number of Emitters & Controls
1504.5.5 Number of Emitters. The minimum number of emitters and the maximum discharge of each emitter in an irrigation field shall be in accordance with Table 1504.5.5.
1504.5.6 Controls. The system shall provide user controls such as valves, switches, timers, and other controllers to rotate the distribution of gray water between irrigation zones.

TABLE 1504.5.5
SUBSURFACE IRRIGATION DESIGN CRITERIA FOR SIX TYPICAL SOILS

TYPE OF SOIL	MAXIMUM EMITTER DISCHARGE (gallons per day)	MINIMUM NUMBER OF EMITTERS PER GALLON OF ESTIMATED GRAY WATER DISCHARGE PER DAY* (gallons per day)
Sand	1.8	0.6
Sandy loam	1.4	0.7
Loam	1.2	0.9
Clay loam	0.9	1.1
Silty clay	0.6	1.6
Clay	0.5	2.0

For SI units: 1 gallon per day = 0.000043 L/s
* The estimated gray water discharge per day shall be determined in accordance with Section 1503.8 of this code.

1504.5.7 Maximum Pressure
Where pressure at the discharge side of the pump exceeds 20 pounds-force per square inch (psi), a pressure-reducing valve able to maintain downstream pressure not exceeding 20 psi shall be installed downstream from the pump and before an emission device.

1504.6.1 & 1504.6.2 Mulch Basin Design and Construction

1504.6.1 The gray water discharge to a mulch basin is limited to single family and multi-family dwellings.

1504.6.2 Size. Mulch basins shall be of sufficient size to accommodate peak flow rates and distribute the total amount of estimated gray water on a daily basis without surfacing, ponding, or runoff. Mulch basins shall have a depth of not less than 10 inches. The mulch basin size shall be based on the maximum absorption capacity of the soil determined using Table 1504.2.

1504.6.3 Minimum Depth. Gray water supply piping, including drip feeders, shall be not less than 2 inches below finished grade and covered with mulch.

1504.6.4 Maintenance. The mulch basin shall be maintained periodically to retain the required depth and area, and to replenish the required mulch cover.

1504.7 and sub-sections Subsoil Irrigation Field

1504.7.1 Minimum Pipe Size. … 3 inches…

1504.7.2 Filter Material & Backfill. …3/4” to 2½”… perforated section covered with filter material… No earth backfill shall be placed over the filter material cover until after inspection and acceptance.

1504.7.3 Subsoil Irrigation Field Construction. … in accordance with Table 1504.7.3… irrigation lines shall be stepped… lines between each horizontal leeching section shall be made with approved watertight joints…

1504.8 Gray Water System Color and Marking Information
Pressurized gray water distribution systems shall be identified as containing nonpotable water in accordance with section 603.1 of this code.

1504.9 Other Collection and Distribution Systems
Other collection and distribution systems shall be approved by the local AHJ, as allowed by Section 301.3 of this code.

1504.9.1 Higher Requirements
Nothing contained in this chapter shall be construed to prevent the AHJ from requiring compliance with higher requirements than those contained herein, where such higher requirements are essential to maintaining a safe and sanitary condition.

1504.10 Testing
Building drains and vents for gray water systems shall be tested in accordance with this code. Surge tanks shall be filled with water to the overflow line prior to and during the inspection. Seams and joints shall be left exposed, and the tank shall remain watertight. A flow test shall be performed through the system to the point of gray water discharge. Lines and components shall be watertight up to the point of the irrigation perforated and drip lines.

1504.11 Maintenance
Gray water systems and components shall be maintained in accordance with Table 1501.5.

1505.1 General Reclaimed (Recycled) Water Systems
The provisions of this section shall apply to the installation, construction, alteration, and repair of reclaimed (recycled) water systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, aboveground and subsurface irrigation, industrial or commercial cooling or air conditioning and other uses approved by the AHJ.

1505.2 Permit
It shall be unlawful for a person to construct, install, alter, or cause to be constructed, installed, or altered a reclaimed (recycled) water system within a building or on premises without first obtaining a permit to do such work from the AHJ.

1505.2.1 Plumbing Plan Submission
No permit for a reclaimed (recycled) water system shall be issued until complete plumbing plans, with data satisfactory to the AHJ, have been submitted and approved.

1505.3 System Changes
No changes or connections shall be made to either the reclaimed (recycled) water system or the potable water system within site containing a reclaimed (recycled) water system without approval by the AHJ.

1505.4 Connections to Potable or Reclaimed Water (Recycled) Systems
Reclaimed (recycled) water systems shall have no connection to a potable water supply system or alternate water source system. Potable water is permitted to be used as makeup water for a reclaimed (recycled) water storage tank provided the water supply inlet is protected by an air gap or reduced-pressure principle backflow preventer in accordance with this code.

1505.5 new section, added 2024 Water Pressure
Reclaimed (recycled) water systems supplying water to water closets, urinals, and trap primers shall be capable of delivering not less than 15 pounds-force per square inch (psi) (103 kPa) residual pressure at the highest and most remote outlet served. Where the water pressure in the reclaimed water supply system within the building exceeds 80

psi (552 kPa), a pressure reducing valve reducing the pressure to 80 psi (552 kPa) or less to water outlets in the building shall be installed.

1505.6 numbering changed due to new section above Initial Cross-Connection Test
A cross-connection test is required in accordance with Section 1502.3. Before the building is occupied or the system is activated, the installer shall perform the initial cross-connection test in the presence of the AHJ and other authorities having jurisdiction. The test shall be ruled successful by the AHJ before final approval is granted.

1505.7 (re-numbered) Reclaimed (Recycled) Water System Materials
Reclaimed (recycled) water supply and distribution system materials shall comply with the requirements of this code for potable water supply and distribution systems unless otherwise provided for in this section.

1505.8 (re-numbered) Reclaimed (Recycled) Water System Color and Marking…
Reclaimed (recycled) water systems shall have a colored background and marking information in accordance with Section 601.3 of this code.

1505.9 (re-numbered) Valves
Valves, except fixture supply control valves, shall be equipped with a locking feature.

1505.10 (re-numbered) Hose Bibbs
Hose bibbs shall not be allowed on reclaimed (recycled) water piping systems located in areas accessible to the public. Access to reclaimed (recycled) water at points in the system accessible to the public shall be through a quick disconnect device that differs from those installed on the potable water system. Hose bibbs supplying reclaimed (recycled) water shall be marked with the words: “CAUTION: NONPOTABLE RECALIMED WATER, DO NOT DRINK”, and the symbol in Figure 1505.9.

1505.11 (re-numbered) Required Appurtenances
The reclaimed (recycled) water system and the potable water system within the building shall be provided with the required appurtenances (e.g., valves, air/vacuum relief valves, etc.) to allow for deactivation or drainage as required for a cross-connection test in accordance with Section 1502.3.

1505.12 (re-numbered) Same Trench as Potable Water Pipes
Reclaimed (recycled) water pipes shall be permitted to be run or laid in the same trench as potable water pipes with 12 inches minimum vertical and horizontal separation where both pipe materials are approved for use within a building. Where piping materials do no meet this requirement, the minimum horizontal separation shall be increased to 60 inches. The potable water piping shall eb installed at an elevation above the reclaimed (recycled) water piping. Reclaimed (recycled) water pipes laid in the same trench or crossing building sewer or drainage piping shall be installed in accordance with this code for potable water piping.

1505.13 (re-numbered) Signs
Signs in rooms and water closet tanks in buildings using reclaimed (recycled) water shall be in accordance with Section 1501.9 and Section 1509.1.

1505.14 (re-numbered) Inspection and Testing
Reclaimed (recycled) water systems shall be inspected and tested in accordance with Section 1502.1.

1506.1 General On-Site Treated Nonpotable Water Systems
The provisions of this section shall apply to the installation, construction, alteration, and repair of on-site treated nonpotable water systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, above and belowground irrigation, and other uses approved by the AHJ.

1506.2 Plumbing Plan Submission
No permit for an on-site treated nonpotable water system shall be issued until complete plumbing plans, with data satisfactory to the AHJ, have been submitted and approved.

1506.3 System Changes
No changes or connections shall be made to either the on-site treated nonpotable water system or the potable water system within a site containing an on-site treated nonpotable water system without approval by the AHJ.

1506.4 Connection to Potable or Reclaimed (Recycled) Water Systems
On-site treated nonpotable water systems shall have no connection to a potable water supply system or reclaimed (recycled) water source system. Potable or reclaimed (recycled) water is permitted to be used as makeup water for a non-pressurized storage tank provided the makeup water supply is protected by an air gap in accordance with this code.

1506.5 new section, added 2024 Water Pressure
On-site treated non-potable water systems supplying water to water closets, urinals, and trap primers shall be capable of delivering not less than 15 pounds-force per square inch (psi) (103 kPa) residual pressure at the highest and most remote outlet served. Where the water pressure in the on-site treated non-potable water supply system within the building exceeds 80 psi (552 kPa), a pressure reducing valve reducing the pressure to 80 psi (552 kPa) or less to water outlets in the building shall be installed.

1506.6 re-numbered due to new section above Initial Cross-Connection Test
A cross-connection test is required in accordance with Section 1502.3. Before the building is occupied or the system is activated, the installer shall perform the initial cross-connection test in the presence of the AHJ and other authorities having jurisdiction. The test shall be ruled successful by the AHJ before final approval is granted.

1506.7 (re-numbered) On-Site Treated Nonpotable Water System Materials
On-site treated nonpotable water supply, and distribution system materials shall comply with the requirements of this code for potable water supply and distribution systems unless otherwise provided for in this section.

1506.8 (re-numbered) added standards On-Site Treated Nonpotable Water Devices and Systems
Devices or equipment used to treat on-site treated nonpotable water to maintain the minimum water quality requirements determined by the AHJ shall be listed or labeled (third-party certified) by a listing agency (accredited conformity assessment body) or approved for the intended application. Devices or equipment used to treat on-site nonpotable water for use in water closet or urinal flushing, surface irrigation, and similar applications shall comply with *IAPMO IGC 324*, NSF/*ANSI* 350 or approved by the AHJ.

1506.9 (re-numbered) On-Site Treated Nonpotable Water System Color & Marking…
On-site treated nonpotable water systems shall have a colored background and marking information in accordance with Section 601.3 of this code.

1506.10 (re-numbered) Design and Installation
The design and installation of on-site treated nonpotable water systems shall be in accordance with Section 1506.9.1 through Section 1506.9.5.

1506.10.1 (re-numbered) Listing Terms and Installation Instructions
On-site treated nonpotable water systems shall be installed in accordance with the terms of its listing and the manufacturer's installation instructions.

1506.10.2 (re-numbered) Minimum Water Quality
On-site treated nonpotable water supplied to toilets or urinals or for other uses in which it is sprayed or exposed shall be disinfected. Acceptable disinfection methods shall include chlorination, ultraviolet sterilization, ozone, or other methods as approved by the AHJ. The minimum water quality for on-site treated nonpotable water systems shall meet the applicable water quality requirements for the intended applications as determined by the public health AHJ.

1506.10.3 (re-numbered) Deactivation and Drainage
The on-site treated nonpotable water system and the potable water system within the building shall be provided with the required appurtenances (e.g. valves, air/vacuum relief valves, etc.) to allow for deactivation or drainage as required for a cross-connection test in accordance with Section 1502.3.

1506.10.4 (re-numbered) Near Underground Potable Water Pipe
On-site treated nonpotable water pipes shall be permitted to be run or laid in the same trench as potable water pipes with 12 inches minimum vertical and horizontal separation where both pipe materials are approved for use within a building. Where piping materials do no meet this requirement, the minimum horizontal separation shall be

increased to 60 inches. The potable water piping shall be installed at an elevation above the reclaimed (recycled) water piping. Reclaimed (recycled) water pipes laid in the same trench or crossing building sewer or drainage piping shall be installed in accordance with this code for potable water piping.

1506.10.5 (re-numbered) Required Filters
A filter permitting the passage of particulates no larger than 100 microns (100 µm) shall be provided for on-site treated nonpotable water supplied to water closets, urinals, trap primers, and drip irrigation system.

1506.11, 1506.12 and 1506.13 (all re-numbered) Valves, Signs, Inspection and Testing

1506.11 Valves. Valves, except fixtures supply control valves, shall be equipped with a locking feature.
1506.12 Signs. Signs in building using on-stie treated nonpotable water shall comply with Section 1501.9 and Section 1505.9.1.
1506.13 Inspection and Testing. On-site treated nonpotable water systems shall be inspected and tested in accordance with Section 1502.1.

Appendix L Sustainable Practices

Construction changed… Plumbing changed…
Our approach & values are evolving…

- Canada/US/World Green Building Council (LEED)
- Green Globes
- Net Zero
- Living Building

L 101.1 Applicability
The purpose of this appendix is to provide a comprehensive set of technically sound provisions to 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 the health, safety, and general welfare requirements of this code.

L201.1 new section, added 2024 General
For the purpose of this appendix, the following definitions shall apply:

L 201.0 Definitions
Catch Can Test. Method to measure the precipitation rate of an irrigation system by placing catchment containers at various random positions in the irrigation zone for a prescribed amount of time during the irrigation application. The volume of water in the containers are measured, averaged, and calculated to determine precipitation rate. Tests are conducted using irrigation industry accepted practices.

Combination Ovens. A device that combines the function of hot air convection (oven mode) and saturated and superheated steam heating (steam mode), or both, to perform steaming, baking, roasting, rethermalizing, and proofing of various food products. In general, the term combination oven is used to describe this type of equipment, which is self-contained. The combination oven is also referred to as a combination oven/steamer, combi, or combo.

L201.1 new definition, added 2024
Dedicated Meter
A water measuring device used at a subsection or end use of a water supply system for any of the following purposes: billing, water management, collecting and analyzing water usage data, detection of leaks, equipment failure, water waste, and irregular or abnormal use for a specific application. Also called a submeter.

Dry Weather Runoff
Water that flows along a surface, in a channel or sub-surface including groundwater seepage, and is not associated with a rain event.

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.

ET_C
Evapotranspiration rate of the plants derived by multiplying ETo by the appropriate plant factor or coefficient.

ET_O
Reference evapotranspiration for a cool-season grass as calculated by the standardized Penman-Monteith equation based on weather-station data.
L201.1 new definition, added 2024
Definitions

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

Flow Through Design
A fitting or a fitting configuration with two primary inlet connections and one, or more outlet connections with the purpose to supply water to a fixture fitting.
L201.1 new definition, added 2024
Definitions

Food Steamers (Steam Cookers). A cooking appliance wherein heat is imparted to food in a closed compartment by direct contact with steam. The compartment can be at or above atmospheric pressure. The steam can be static or circulated.
L 201.0
Definitions

Gang Showers. Shower compartments designed and intended for use by multiple persons simultaneously.

Hydrozone. A grouping of plants with similar water requirements that are irrigated by the same irrigation zone.

Irrigation Control System. An irrigation control system consists of a combination of a programmable controller using one or more inputs or sensors that, in combination, estimate or measure the availability of moisture for plants in order to operate an irrigation system, in such manner that the system replenishes water as needed while minimizing excess water use. A properly programmed irrigation control system requires initial site specific set-up and will make irrigation schedule adjustments, including run times and required cycles throughout the irrigation season without human intervention.
L 201.0
Definitions

Irrigation Demand. The amount of water not supplied by natural precipitation that is needed to maintain landscape plant life in good condition. Irrigation demand is calculated by subtracting natural effective precipitation from the ET rate adjusted by the landscape coefficient, which includes the functional purpose and desired quality of the plant being irrigated.

Irrigation Emission Device. The various landscape irrigation equipment terminal fittings or outlets that emit water for irrigating vegetation in a landscape.

Irrigation Zone. The landscape area that is irrigated by a set of landscape irrigation emission devices installed on the same water supply line downstream of a single valve.

Kitchen and Bar Sink Faucets. A faucet that discharges into a kitchen or bar sinks in domestic or commercial installations. Supply fittings that discharge into other type sinks, *including clinical sinks, floor sinks, service sinks and* laundry trays are not included.

Lavatory. (1) A basin or vessel for washing. (2) A plumbing fixture, as defined in (1), especially placed 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.
Lavatory Faucet. A faucet that discharges into a lavatory basin in a domestic or commercial installation.

Low Application Rate Irrigation. A means of irrigation using low precipitation rate sprinkler heads or low flow emitters in conjunction with cycling irrigation schedules to apply water at a rate less than the soil absorption rate.

Low Flow Emitter. Low flow irrigation emission device designed to dissipate water pressure and discharge a small uniform flow or trickle of water at a constant flow rate. ~~To be classified as a low flow emitter: drip emitters shall discharge water at less than 4 gallons per hour per emitter; micro spray, micro-jet, and misters shall discharge water at a maximum rate of 30 gallons per hour per nozzle.~~
L 201.0 verbiage deleted
Definitions

Low Precipitation Rate Sprinkler Heads. Landscape irrigation devices or sprinkler heads with a maximum precipitation rate of 1 inch per hour over the applied irrigation area.

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.

Modified Evapotranspiration. Numeric values, expressed in inches/hour of evapotranspiration rates, derived by altering ETo rates by applying factors of specific needs of the vegetation and local climate conditions. Modified evapotranspiration rates are used as a factor in estimating the irrigation water needs of landscapes. Common usage includes reference evapotranspiration as the base rate, modified by coefficients or factors for specific plant types and densities.

Multi-Occupant Spaces. Indoor spaces used for presentations and training, including classrooms and conference rooms.

On-Site Renewable Energy
Energy generated from renewable sources produced at the building site. [ASHRAE 90.1:3.2]

Precipitation Rate. The sprinkler head application rate of water applied to landscape irrigation zone, measured as inches per hour. Precipitation rates of sprinkler heads are calculated according to the flow rate, pattern, and spacing of the sprinkler heads.

Pre-Rinse Spray Valve. A handheld device for use with commercial dishwashing and ware washing equipment that sprays water on dishes, flatware, and other food service items for the purpose of removing food residue before cleaning and sanitizing the items.

Recirculation System. A system of hot water supply and return piping with shutoff valves, balancing valves, circulating pumps, and a method of controlling the circulating system.

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

Renewable Energy Resources
Energy from solar, wind, biomass or hydro, or extracted from hot fluid or steam heated within the earth. [ASHRAE 90.1:3.2]

Reverse Osmosis Reject Water. Water that does not pass through a membrane of a reverse osmosis system.

Run Out. The developed length of pipe that extends away from the circulating loop systems to a fixture(s).

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

Single Occupant Spaces. Private offices, workstations in open offices, reception workstations, and ticket booths.

Soil Absorption Rate. The rate of the soil's ability to allow water to percolate or infiltrate the soil and be retained in the root zone of the soil expressed in inches per hour.

Sprinkler Head. Landscape irrigation emission device discharging water in the form of sprays or rotating streams, not including low flow emitters.

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

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

Stormwater Catchment System. A system that collects and stores stormwater for beneficial use.

Submeter. A meter installed subordinate to a site meter. Also known as a dedicated meter.

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

Water Closet. A fixture with a water-containing receptor that receives liquid and solid body waste and on actuation conveys the waste through an exposed integral trap into a drainage system. Also referred to as a toilet.

~~**Water Factor (WF).** A measurement and rating of appliance water efficiency, most often used for residential and light commercial clothes washers as follows:~~

~~**Water Factor (WF), Clothes Washer.** The quantity of water in gallons used to complete a full wash and rinse cycle per measured cubic foot capacity of the clothes container.~~

L 301.1 General Regulations
301.1 Installation. … shall be installed in accordance with this code, other applicable codes, and the manufacturer's installation instructions.
301.2 Qualifications. Where permits are required, the AHJ shall have 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 requirements of this code.

L 303.1 Abandonment
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.

L 401.1 and L 402.1Water Conservation and Efficiency

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

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

TABLE L 402.1
MAXIMUM FIXTURE AND FIXTURE FITTINGS FLOW RATES

FIXTURE TYPE	FLOW RATE
Showerheads	2.0 gpm at 80 psi[1]
Kitchen faucets residential[4]	1.8 gpm at 60 psi
Lavatory faucets residential[5]	1.5 gpm at 60 psi
Lavatory faucets other than residential	0.5 gpm at 60 psi
Metering faucets	0.25 gallons/cycle
Metering faucets for wash fountains	One 0.25 gallons/cycle fixture fitting for each 20 inches rim space
Wash fountains	One 2.2 gpm at 60 psi fixture fitting for each 20 inches rim space
Water Closets	1.28 gallons/flush[2]
Urinals	0.5 gallons/flush[3]
Commercial Pre-Rinse Spray Valves	See Section L 402.9

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

Notes:

1 Shall be listed to EPA WaterSense Specification for Showerheads. For multiple showerheads serving one shower compartment see Section L 402.6.1.

2 Shall be listed to EPA WaterSense Specification for Tank-Type Toilet or Specification for Flushometer-Valve Water Closets.

3 Shall be listed to EPA WaterSense Flushing Urinal Specification. Nonwater urinals shall comply with specifications listed in Section L 402.3.1.

4 See Section L 402.4.

5 Shall be listed to EPA WaterSense High-Efficiency Lavatory Faucet Specification.

L 402.2 and sub-sections Water Closets

No water closet shall have an effective flush volume exceeding 1.28 gallons per flush (gpf).

L 402.2.1 Gravity, pressure-assisted, and electro-hydraulic tank-type water closets …listed to EPA WaterSense Specification for Tank-Type Toilets. The effective flush volume for dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

L 402.2.2 Flushometer… 1.28gpf… listed to WaterSense.

L 402.3 Urinals

Urinals shall have a maximum flush volume of not more than 0.5 gallon of water per flush… listed to EPA WaterSense Flushing Urinal Specification.

L 402.3.1 Nonwater Urinals. …cleaned and maintained… waterline roughed-in… not less than 56” to allow for installation of approved backflow prevention device… Such water distribution lines shall be installed with shutoff valves located as close as possible to the distributing main to prevent creation of dead ends… one, 1 DFU fixture installed upstream…

L403.3.2 New section, added 2024 Nonwater Urinals with Drain Cleansing Action

Nonwater urinals with drain cleansing action shall comply with ASME A112.19.19 and shall be cleaned, maintained, and installed in accordance with the manufacturer’s installation instructions.

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

L 402.5 Lavatory Faucets

- The maximum water flow rate of faucets shall comply with Section L 402.5.1 and Section L 402.5.2.
- 402.5.1 …Residential. …flow rate shall not exceed 1.5 gpm… listed to EPA WaterSense High Efficiency Lavatory Faucet Specification.
- 402.5.2 … other than residential…
  (1) shall not exceed 0.5 gpm
  (2) metering faucets… not more than 0.25 gal per cycle

L 402.6 standard added 2024 Showerheads
Showerheads shall not exceed 2.0 gpm at 80 psi, and shall be listed to *ASME A112.18.1/CSA B125.1 and* EPA WaterSense Specification for Showerheads.

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 a diverter, including rain systems, waterfalls, bodysprays, and jets, shall not exceed 2.0 gpm per shower compartment, where the floor area of the shower compartment is less than 1800 sq. in. For each increment of 1800 sq. in. of floor area after that or part thereof, additional showerheads are allowed, provided the total flow rate of water from flowing devices shall not exceed 2.0 gpm for each increment.
Exceptions:
(1) Gang showers in nonresidential occupancies. Singular showerheads or multiple shower outlets serving one showering position in gang showers shall not have more than 2.0 gpm 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 total flow, where one outlet is the hand shower.

L 402.6.2 and L 402.6.3 Bath and Shower Diverters & Shower Valves
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 *rate of leakage* in accordance with ASME A 112.18.1/CSA B125.1.

L 402.6.2 and L 402.6.3 verbiage changed/deleted, 2024
Shower Valves. Shower valves shall comply with the temperature control performance requirements of ASSE 1016/ASME A112.1016/CSA B125.1 *when tested for the rated flow rate of the installed showerhead* ~~where tested at 2.0 gpm~~.

L 402.7 Recirculating Shower Systems
Recirculation shower systems shall comply with IAPMO IGC 330.

L402.8 new section, added 2024 Bath and Shower Flow-Reduction Devices
Bath and shower flow-reduction devices shall comply with IAPMO IGC 244.

L 402.9 re-numbered due to new section above; added/deleted verbiage Commercial Pre-Rinse Spray Valves
The flow rate for a pre-rinse spray valve installed in a commercial kitchen to remove food waste from cookware and dishes before cleaning shall not be more than *the maximum flow rate , as specified in Table L 402.9.* ~~1.28 gpm at 60 psi.~~ Where pre-rinse spray valves with maximum flow rates of 1.0 gpm or less are installed, the static pressure shall not be less than 30 psi. Commercial kitchen pre-rinse spray valves shall be equipped an integral shutoff. ~~Pre-rinse spray valves shall be listed to the EPA WaterSense Commercial Pre-rinse Spray Valve Specification.~~

L 402.9 New Table

TABLE L 402.9
COMMERCIAL PRE-RINSE SPRAY VALVE
MAXIMUM FLOW RATE

PRODUCT CLASS BY SPRAY FORCE	MAXIMUM FLOW RATE (GPM)
Product Class 1 (≤ 5.0 ounces-force)	1.00
Product Class 2 (> 5.0 ounces-force and ≤ 8.0 ounces-force)	1.20
Product Class 3 (> 8.0 ounces-force)	1.28

For SI units: 1 gallon per minute = 3.785 L/min, 1 ounce-force = 0.278 N.

L 402.10 (re-numbered) Emergency Safety Showers & Eye Wash Stations
Emergency Safety Showers and Emergency Eyewash Stations. Emergency safety showers and emergency eyewash stations shall not be limited to their water supply flow rates.

L 402.11 new verbiage, added 2024 Drinking Fountains *and Bottle Filling Stations*
Bottle filling stations shall be included on or used as a substitute to meet the requirements of drinking fountains in at least 50 percent of the requirements for drinking fountains. Bottle filling stations and drinking fountains shall be self-closing.

L 403.1 and L 403.2 Appliances
Dishwashers. Residential and commercial dishwashers shall comply with the Energy Star program requirements.

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 404.1 Commercial Food Service. Occupancy Specific Water Efficiency Requirements
Commercial food service facilities shall comply with the water efficiency requirements in Section L 404.2 through section L 404.7.5.

L 404.2 Ice Makers. New verbiage added, 2024 Occupancy Specific Water Efficiency Requirements
Ice makers shall be air cooled and shall be in accordance with Energy Star for energy use for commercial ice machines. *Ice makers producing cubed-type ice shall not exceed 20 gallons (75.7 L) of water per 100 pounds (45.4 kg) of ice produced. Ice makers producing nugget and flake ice shall not exceed 14 gallons (63.6 L) of water per 100 pounds (45.4 kg) of ice produced.*

L 404 3 Food Steamers. Occupancy Specific Water Efficiency Requirements
Boilerless type steamers shall consume not more than 2.0 gal per compartment. Boiler type steamers shall not consume more than 1.5 gal/hour.

L 404.4 Combination Ovens
Combination ovens shall not use water in convection mode except when utilizing a moisture nozzle for food products in the oven. The total amount of water used by the moisture nozzle in convection mode shall not exceed half a gallon per hour per oven cavity. When operating in steamer mode, combination ovens shall not consume more than 1.5 gallons per hour per pan.

L 404.5 Grease Interceptors
Grease interceptor maintenance procedures shall not include post-pumping/cleaning refill using potable water. Refill shall be by connected appliance accumulated discharge only.

L404.5.1 new sub-section, 2024 Temperature
Grease Interceptors shall be designed and installed to maintain a mean temperature not exceeding 95°F (35°C). FOG (fats, oils, and greases) disposal systems in compliance with ASME A112.14.6 using biological cultures shall not exceed 104°F (40°C). Passive or active cooling and heat recovery to be employed where applicable.

L 404.6 completely reworked section Dipper Well Faucets
Where dipper wells have a permanent water supply, the faucet shall have metered or sensor activated flow. The volume of water dispensed into a dipper well in each activation cycle of a self-closing fixture fitting shall not exceed the water capacity of the dipper well, and the maximum flow shall not exceed 0.2 gpm (0.8 L/m) at a supply pressure of 60 psi (414 kPa).

L 404.7 and sub-sections Food Waste Devices
Where installed, food waste devices shall be in accordance with Section 404.7.1 through 404.7.5.

L 404.7.1 Pulpers and Mechanical Strainers. The water use for pulpers or mechanical strainers shall not exceed ~~3~~ 2 gpm. A flow restrictor shall be installed on the water supply to limit the water flow.

L 404.7.2 Food Waste Disposers. The water use for the food waste grinder shall not exceed 8 gpm under full load condition and 1 gpm 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. A load sensing device shall be installed to monitor current demand and regulate water flow.

L 404.7.3 Time Out and Shut Off. Pulpers, mechanical strainers, and food waste disposers shall have a time out system with push button to reactivate. The maximum allowable run time cycle shall be 10 minutes.

L 404.7.4 Sink Drain Outlets. Where a strainer or basket is installed, they shall be readily removeable.

L 404.7.5 Strainer Baskets. Strainer (scrapper) baskets shall either fit over a sink compartment or be attached to a drain system. The strainer baskets shall be readily removeable for emptying.

L404.8 new section, 2024 Tempering Water
The discharge waste from commercial dishwashers, ware washers, combination ovens, and food steamers that exceeds 140°F (60°C) shall not be tempered with potable water.

Section L 404.9 through Section 404.11. Medical and Laboratory Facilities
Medical and laboratory facilities shall comply with the water efficiency requirements in

L404.10 Steam Sterilizers. Controls shall be installed to limit the discharge temperature of condensate or water from steam sterilizers to 140^0F or less. A venturi-type vacuum system shall not be utilized with vacuum sterilizers.

L 404.8 and sub-sections continued Medical and Laboratory Facilities
L 404.11 X-Ray Film Processing Units. Processors for X-ray film exceeding 6 inches in any dimension shall be equipped with water recycling units.

L 404.8 and sub-sections continued Medical and Laboratory Facilities
L 404.12 Exhaust Hood Liquid Scrubber Systems. Liquid scrubber systems for exhaust hoods and ducts shall be of the recirculation type… for perchloric acid exhaust hoods and ducts shall be equipped with a timer-controlled water recirculation system. The collection sump for perchloric acid systems shall be designed to drain automatically after the wash down process has completed.

L 405.1 one sentence deleted, one added, 2024 Leak Detection and Control
L 405.1 General. Where installed, leak detection and control devices shall comply with IAPMO IGC 115 or IAPMO IGC 349. ~~Leak detection and control devices help protect property from water damage and also conserve water by shutting off the flow when a leak is detected.~~ *Where installed, leak detection and control devices shall comply with ANSI/CAN/IAPMO Z1349. Leak detection with control devices shall not be installed where they isolate fire sprinkler systems.*

L 406.0 Fountains and Other Water Features
L 406.1 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.

L 407.0 new verbiage & deletions, 2024 Meters
L 407.1 Required. A water meter shall be required for *each* building~~s~~ *site* connected to a public water system, including municipally supplied reclaimed (recycled) water. In other than single-family houses, *a dedicated meter shall be installed in accordance with Table L 407.1.* ~~multifamily structures of three stories or fewer above grade, and modular houses, a separate submeter shall be installed in the following locations:~~

Meters
~~(1) The water supply for irrigated landscape with an accumulative area exceeding 2500 square feet.~~
~~(2) The water supply to a water-using process where the consumption exceeds 1000 gallons per day, except for manufacturing processes.~~
~~(3) The water supply to each building on a property with multiple buildings where the water consumption exceeds 500 gals/d.~~
~~(4) The water supply to an individual tenant space on a property where one or more of the following applies:~~
~~(a) Water consumption exceeds 500 gals/d for that tenant.~~
~~(b) Tenant space is occupied by a commercial laundry, cleaning operation, restaurant, food service, medical office, dental office, laboratory, beauty salon, or barbershop.~~
~~(c) Total building area exceeds 50 000 square feet.~~
~~(5) The makeup water supplies to a swimming pool.~~

L 407.2 Approval
Dedicated meters, other than water utility meters, shall be approved by the AHJ for the intended use.

L 407.3 new verbiage, 2024 Remote Data Transfer Requirements
Where more than 10 non-utility-owned water meters are located at a building site, the meters shall include remote data transfer capability to collect and analyze the data at a single location.

L 407.4 Access
Meters and submeters shall be accessible.

L 408.0 Condensate Recovery

L 408.1 General. Condensate is permitted to be used as on-site treated nonpotable water when collected, stored, and treated in accordance with Section 1506.0.

L 408.1.1 Condensate Drainage Recovery. Condensate from air-conditioning, boiler and steam systems used to supply water for non-potable water systems shall be in accordance with Section 1506.0.

L 407.1, new, 2024 New Table
Specific water metering requirements for different applications.

TABLE L 407.1
DEDICATED WATER METERING REQUIREMENTS

APPLICATION	REQUIREMENTS
Cooling Towers	The makeup water supply to cooling towers, evaporative condensers, and fluid coolers. Cooling towers sharing a common basin can be grouped together using one meter.
Evaporative Coolers	The makeup water supply to an evaporative cooler having an air flow exceeding 30 000 cubic feet per minute (ft^3/min).
Fluid Coolers and Chillers – Open Systems	The makeup water supply on water-cooled fluid coolers and chillers not utilizing closed- loop recirculation.
Hydronic Cooling Systems – Closed Loop	Systems with 50 ton or greater of cooling capacity and where a make-up water supply is connected.
Hydronic Heating Systems	The makeup water supply to one or more boilers collectively exceeding 1 000 000 British thermal units per hour (Btu/h).
Industrial Processes	The water supply to an industrial water-using process where the average consumption exceeds 1000 gallons per day (gal/d). Like equipment sharing one common water supply can be grouped together using one meter. **Exception:** Processes using untreated water where the water is directly returned to the original source after use.
Landscape Irrigation	Landscape irrigation water where either of the following conditions exist: (1) Total accumulated landscape area with in-ground irrigation system exceeds 2500 square feet (ft^2), or (2) Total accumulated landscape area using an automatic irrigation controller exceeds 1500 square feet (ft^2) **Exception:** Where the water purveyor provides a separate water supply meter that serves only the irrigation system, an additional dedicated meter is not required.
Onsite Water Collection Systems	Potable or reclaimed water supplies for supplementing onsite alternative water collection systems.
Ornamental Water Features	Potable or reclaimed water supplies for ornamental water features where the water feature uses an automatic refill valve.
Roof Spray Systems	Roof spray systems for irrigating vegetated roofs or thermal conditioning covering an area greater than 300 square feet (ft^2). **Exception:** Temporary above-surface spray systems connected to a hose bibb and without an automatic controller are not required to have a dedicated meter
Tenant Buildings - Common Areas	Water supplies used in common areas of a site. The dedicated meter for common area water use shall not include water supplied inside tenant space. Water supplies for sanitary fixtures and other water use in common areas can be grouped together for metering requirements, except where dedicated water meter installations are otherwise required.
Tenant Spaces - Residential	All water supplies to each residential tenant space for indoor water use. **Exception:** Where a water purveyor has individual meters for each tenant space, and the other meter requirements included in Table L 407.1 do not apply, no additional dedicated meter is required.
Tenant Spaces - Non-residential, car washes	All water supplies to individual non-residential tenant spaces for indoor water use where any of the following conditions exist: (1) The nominal size of a water supply pipe(s) to the individual tenant space is greater than ½ inch, or (2) Water consumption within in the tenant space is estimated or expected to average greater than 1000 gallons/day (gal/d). Where water is supplied to tenant space that is not required to have dedicated meter, the water supply pipe (s) shall be accessible to install a meter. **Exception:** Where a water purveyor has individual meters for each tenant space and the other meter requirements included in Table L 407.1 do not apply, no additional dedicated meter is required.

For SI units: 1 gallon per day = 3.785 L/day, 1 inch = 25.4 mm, 1 square foot = 0.0929 m^2, 1000 British thermal units per hour = 0.293 kW, 1 cubic foot per minute (CFM) = 0.4719 L/s, 1 ton = 3.5169 kW

L 409.0 Water Powered Sump Pumps
L 409.1 General. Sump pumps powered by potable water or reclaimed (recycled) water pressure shall be used as an emergency backup pump. The water-powered pump shall be equipped with a battery powered alarm having a minimum rating of 85 dBa at 10'. Water-powered pumps shall have a water efficiency factor of pumping at least 1.4 gallons of water to a height of 10' for every gallon of water used to operate the pump, measured at a water pressure of 20 psi. Pumps shall be labeled as to the gallons of water pumped per gallons of potable water consumed.

Water-powered stormwater sump pumps shall be equipped with a reduced pressure principle backflow prevention assembly.

L 410.1 Water Softeners and Treatment Devices
L 410.1 Water Softeners. Water softeners shall be listed to NSF 44. Water softeners shall have a rated salt efficiency exceeding 3400 grains of total hardness exchange per pound of salt, based on sodium chloride (NaCl) equivalency, and shall not generate more than 4 gallons of water per 1000 grains of hardness removed during the service cycle.

L 410.2 Water Softener Limitations
In residential buildings, where the supplied potable water is equal to or less than 8 grains per gallon measured as total calcium carbonate equivalents, water softening equipment that discharges water into the wastewater system during the service cycle shall not be allowed, except as required for medical purposes.

L 410.3 Point-of Use Reverse Osmosis Water Treatment Systems
Reverse osmosis water treatment systems installed in residential occupancies shall be equipped with automatic shutoff valves to prevent discharge when there is no call for producing treated water. Reverse osmosis water treatment systems shall be listed in accordance with NSF 58.

L 411.0 and sub-sections Landscape Irrigation Systems

L 411.1 General. Where landscape irrigation systems are installed, they shall be in accordance with Section L 411.2 through Section L 411.14. Requirements limiting the amount or type of plant material used in landscapes shall be established by the AHJ.

Exception: Plants grown for food production.

L 411.2 Backflow Protection. Potable water and supplies to landscape irrigation systems shall be protected from backflow in accordance with this code and the AHJ.

L 411.3 Use of Alternate Water sources for Landscape Irrigation
Where available by pre-existing treatment, storage, or distribution network, and where approved by the AHJ, alternative water source(s) shall be utilized for landscape irrigation. Where adequate capacity and volumes of pre-existing alternative water sources are available, the irrigation system shall be designed to use a minimum of 75 percent of alternative water for the annual irrigation demand before supplemental potable water is used.

L 411.4 Irrigation Control Systems
Where installed as part of a landscape irrigation system, irrigation control systems shall:

(1) Automatically adjust the irrigation schedule to respond to plant water needs determined by weather or soil moisture conditions.
(2) Utilize sensors to suspend irrigation during a 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 water applications and durations to mitigate water flowing off of the intended irrigation zone.
Irrigation Control Systems
(5) … site-specific settings of irrigation control system affecting irrigation posted at control system location… data, 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… run times for each zone… number of cycles to mitigate runoff… monthly adjustments or percentages.

L 411.6 Low Flow Irrigation
Irrigation zones using low flow irrigation emitters shall comply with ASABE/ICC 802 Landscape Irrigation sprinkler and Emitter Standard and shall be equipped with filters sized according to the manufacturer's recommendation for specific low flow emitter, and with a pressure regulator installed upstream of the irrigation emission devices as necessary to reduce the operating water pressure in accordance with the manufacturers' equipment requirements.

L 411.6 Mulched Planting Areas
Only low flow emitters are allowed to be installed in mulched panting areas with vegetation taller than 12 inches.

L 411.7 System Performance Requirements
The landscape irrigation system shall be designed and installed to:

(1) Prevent irrigation water from runoff out of the irrigation zone.
(2) Prevent water in the supply line drainage from draining out between irrigation events.
(3) Not allow irrigation water to be applied onto or enter non-targeted areas including adjacent property and vegetation areas, adjacent hydrozones not requiring the irrigation water to meet its irrigation demand, non-vegetative areas, impermeable surfaces, roadways and structures.

L 411.8 Narrow or Irregularly Shaped Landscape Areas
Narrow or irregularly shaped landscape areas, less than 4 feet in any direction across opposing boundaries, shall not be irrigated by an irrigation emission device except low flow emitters.

L 411.9 Sloped Areas
Where soil surface rises more than 1' per 4' of length, the irrigation zone system average precipitation rate shall not exceed 0.75"/h verified either through either…:

(1) Manufacturer documentation that the precipitation rate for the installed sprinkler head does not exceed 0.75"/h where the sprinkler heads are installed not closer than the specified radius and where the water pressure of the irrigation system is not more than the manufacturer's recommendations.
(2) Catch can test in accordance with the requirements of the AHJ and where emitted water volume is measured with a minimum of six catchment containers at random places within the irrigation zone for a minimum of 15 minutes to determine the average precipitation rate, expressed as inches per hour.

L 411.10 and sub-sections Sprinkler Head Installations

411.10 Sprinkler Head Installations. All installed sprinkler heads shall comply with ASABE/ICC 802 or other approved standard(s).

411.10.1 Sprinkler Heads in Common Irrigation Zones. Sprinkler heads installed in irrigation zones served by a common valves shall be limited to applying water to plants with similar irrigation needs, and shall have matched precipitation rates (identical inches of water application per hour as rated or tested, +/- 5%.)

411.10.2 Sprinkler Head Pressure Regulation. Sprinkler heads shall utilize pressure regulating devices (as part of an irrigation system or integral to the sprinkler head) to maintain manufacturer's recommended operating pressure for each sprinkler and nozzle type.

411.10.3 Pop-up Type Sprinkler Heads. 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" above the soil level where emitting water.

L 411.11 Irrigation Zone Performance Criteria

Irrigation zones shall be designed and installed to ensure the average precipitation rate of the sprinkler heads over the irrigated area does not exceed 1"/h as verified through either of the following methods:

(1) Manufacturer documentation that the precipitation rate for the installed sprinkler head does not exceed 1"/h where the sprinkler heads are installed not closer than the specified radius and where the water pressure of the irrigation system is not more than the manufacturer's recommendations.

(2) Catch can test in accordance with the requirements of the AHJ and where emitted water volume is measured with a minimum of six catchment containers at random places within the irrigation zone for a minimum of 15 minutes to determine the average precipitation rate, expressed as inches per hour.

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 L 411.12.2.

L 411.12.1 Landscape Area. Irrigated landscaped areas not exceeding 10 000 square feet shall have irrigation main lines buried a minimum of 12"… lateral lines buried a minimum of 8". Irrigated landscape areas greater than 10 000 square feet shall have irrigation main lines buried a minimum of18"… lateral lines a minimum of 12".

L 411.12.2 Vehicular Surfaces. Irrigation pipe installed under vehicular paving and pervious pavers, including landscaped fire lanes, shall be sleeved with a minimum of one 1-inch pipe size greater than the irrigation pipe and buried at a minimum depth of 24 inches in all cases.

L 411.13 Backfill
All excavation for irrigation pipe installed shall be backfilled in thin layers to 12” with clean earth, which shall not contain stones, boulders, cinderfill, frozen earth, construction debris, or other materials that would damage or break the piping. Fill shall be properly compacted. Suitable precautions shall be taken to ensure permanent stability for pipe laid in filled or made ground.

L 411.14 Qualifications
The AHJ shall have the authority to regulate landscape irrigation contractors, installers, or designers to demonstrate competency. Where required by the AHJ, the contractor, installer, or designer shall be certified to perform such work.

L 412.0 Trap Seal Protection
412.1 Water Supplied Trap Primers. Water supplied trap primers shall be electronic or pressure activated and shall use not more than 30 gallons 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 supply sources 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 412.0 and sub-sections Vehicle Wash Facilities
L 413.1 Automatic. The maximum make-up water use for automatic washing shall not exceed 40 gallons per vehicle for in-bay automatic car washes and 35 gallons for conveyor and express type car washes.
L 413.2 Self-Service. Spray wands and foamy brushes shall use not more than 3.0 gpm.
L 413.3 Reverse Osmosis. Spot-free reverse osmosis discharge (reject) water shall be recycled.
L 413.4 Towel Ringers. Towel ringers shall have a positive shutoff valve. Spray nozzles shall be replaced annually.
Exception: Bus and large commercial vehicle washes are exempt from requirements of this section.

L 501.0 Water Heating Design, Equipment, and Installation
L 501.1 Scope. The provisions of this section shall establish the means of conserving potable and nonpotable water and energy associated with the generation and use of hot water in a building. This includes provisions for the hot water distribution system, which is the portion of the potable 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.

L 501.2 Insulation
Hot water supply and return piping shall be thermally insulated… thickness of the insulation shall be equal to the nominal diameter of the pipe up to 2”… not be less than 2” for pipe diameters exceeding 2”… conductivity of the insulation [k-factor] measured radially, shall not be more than 0.28… insulation is continuous… within ¼” of appliances, appurtenances, fixtures, structural members, or a wall where the pipe passes through to connect to a fixture within 24”.
Exceptions:
(1) Where the hot water pipe is installed in a wall that is not of a width to accommodate the pipe and insulation, the insulation thickness shall be permitted to have the maximum wall thickness that the wall is capable of accommodating and not less than ½” thick.
(2) Hot water supply piping exposed under sinks, lavatories, and similar fixtures.

L 501.2.1 Pipe Supports
Pipe support shall be installed on the outside of the pipe insulation.
Exception: Vertical supports, and horizontal and vertical anchors shall be installed on the pipe inside the pipe insulation.

L 501.3 Recirculation Systems
Recirculation systems shall comply with Section 501.3.1 and Section 501.3.2.

L 501.3.1 For Low-Rise Residential Buildings. Circulating hot water systems shall be arranged so that the circulating pump(s) are capable of being turned off (automatically or manually) where the hot water system is not in operation. [ASHRAE 90.2-2007:7.2]

L 501.3.2 For Pumps Between Boilers and Storage Tanks. Where used to maintain storage tank water temperature, recirculating pumps shall be equipped with controls limiting operation to a period from the start of the heating cycle to a maximum of 5 minutes after the end of the heating cycle. [ASHRAE 90.1:7.4.4.4]

L 501.4 Recirculation Pump Controls
Pump controls shall include on-demand activation or time clocks combined with temperature sensing. Time clock controls for pumps shall not let the pump operate more than 15 minutes every hour. Temperature sensors shall stop circulation where the temperature set point is reached and shall be located on the circulation loop at or near the last fixtures. The pump, pump controls, and temperature sensors shall be accessible. Pump operation shall be limited to the building’s hours of operation.

L 501.5 Temperature Maintenance Controls
Systems designed to maintain usage temperatures in hot-water pipes, such as recirculating hot water systems or heat trace, shall be equipped with automatic time switches or other controls that are capable of being set to switch off the usage temperature maintenance system during extended periods where hot water is not required. [ASHRAE 90.1:7.4.4.2]

L 501.6 & 501.7 System Balancing & Flow Balancing Valves

L 501.6 System Balancing. Systems with multiple recirculation zones shall be balanced to distribute hot water uniformly, or they shall be operated with a pump for each zone. The circulation pump controls shall comply with the provisions of Section L 501.4.

L 501.7 Flow Balancing Valves. Flow balancing valves shall be a factory preset automatic flow control valve, a flow regulating valve, or a balancing valve with memory stop.

L 501.8 & 501.9 Air Elimination & Gravity or Thermosyphon Systems

L 501.8 Air Elimination. Provision shall be made for the elimination of air from the return system.

L 501.9 Gravity or Thermosyphon Systems. Gravity or thermosyphon systems are prohibited.

Living Building - Seven Petals

International Living Future Institute

TWO PRINCIPLES OF THE LIVING BUILDING CHALLENGE:

1. Living Building Challenge compliance is based on actual, rather than modeled or anticipated, performance. Therefore, projects must be operational for at least twelve consecutive months prior to audit to verify Imperative compliance.
2. All Living Building Challenge projects must be holistic—addressing aspects of all seven Petals through the Core Imperatives.

Living Building Challenge

Living Building

Place = Restoring a healthy interrelationship with nature

Water = Creating developments that operate within the water balance of a given place and climate

Energy = Relying on current solar energy

Health & Happiness = Creating environments that optimize physical and psychological health and well-being

Materials = Endorsing products that are safe for all species through time

Equity = Supporting a just and equitable world

Beauty = Celebrating design that uplifts the human spirit