

CHAPTER 6 WATER USE EFFICIENCY

601.1 (6.1) Scope This section specifies requirements for *potable water* and *nonpotable water* use efficiency, both for the *site* and for the building, and water monitoring.

601.2 (6.2) Compliance All provisions of Section 6 are mandatory provisions.

601.3 (6.3) Mandatory Provisions

601.3.1 (6.3.1) Site Water Use Reduction

601.3.1.1 (6.3.1.1) Landscape Design Landscape design shall comply with the Tempe Zoning Development Code.

601.3.1.2.1 (6.3.1.2.1) Irrigation System Design. The design of the irrigation system shall be performed by an accredited or certified irrigation professional and shall be in accordance with the following:

a. Irrigation systems:

1. Shall be based on *hydrozones*. *Turfgrass* areas shall be on their own *irrigation stations*.
2. Shall have backflow prevention in accordance with the city plumbing code
3. Shall have a master valve on municipally supplied water sources that allows pressurization of the irrigation mainline only when irrigation is scheduled.
4. Shall have a flow sensor and monitoring equipment that will shut off the control valve if the flow exceeds normal flow from an *irrigation station*.
5. Shall prevent piping from draining between irrigation events.

b. Irrigation emission devices shall comply with ASABE/ICC 802, Landscape Irrigation Sprinkler and Emitter Standard.

c. Irrigation sprinklers:

1. Shall not spray water directly on buildings or *hardscape* area.
2. Shall have matched precipitation rate nozzles within an *irrigation station*.
3. Shall be prohibited on landscape areas having any dimension less than 4 ft (1220 mm).
4. Shall have an application rate less than or equal to 0.75 in. (19 mm) per hour on slopes greater than 1 unit vertical in 4 units horizontal.
5. Shall be limited to use with *turfgrass* or *ground cover* areas with vegetation maintained at 8 in. (203 mm) or less in height.

d. Microirrigation zones:

1. Shall be equipped with pressure regulators, filters, and flush assemblies.
2. Shall have indicators that allow confirmation of operation by visual inspection.

601.3.1.2.2 (6.3.1.2.2) Controls: Where any irrigation system for the project *site* uses an *automatic* controller, the system shall be controlled by a qualifying *smart controller* that uses *evapotranspiration (ET)* and weather data to adjust irrigation schedules and that complies with the minimum requirements. Alternatively, the system shall be controlled by an on-site rain or moisture sensor that automatically shuts off the system after a predetermined amount of rainfall or sensed moisture in the soil. Qualifying *smart controllers* shall be labeled according to USEPA WaterSense Specification for Weather-Based Irrigation Controllers or tested in accordance with Irrigation Association SWAT Climatologically Based Controllers, 8th Testing Protocol. *Smart controllers* that use *ET* data shall provide the following irrigation amounts:

- a. *Irrigation adequacy*—80% minimum *ET*,
- b. *Irrigation excess*—not to exceed 10% of *ET_c*.

Exception: A temporary irrigation system used exclusively for the establishment of new landscape shall be exempt from this requirement. Temporary irrigation systems shall be removed or permanently disabled at such time as the *landscape establishment period* has expired.

601.3.1.2.2.1 (6.3.1.2.2.1) The following settings and schedule for the irrigation control system shall be posted on or adjacent to the controller:

- a. Precipitation rate of each *irrigation station*.
- b. *Plant* factors for each *hydrozone*.
- c. Soil type.
- d. Rain sensor settings.
- e. Soil moisture sensor settings, where installed.
- f. Peak demand schedule, including run times, cycle starts, and soak times.

- g. Maximum runtimes to prevent water runoff.

601.3.2 (6.3.2) Building Water Use Reduction

601.3.2.1 (6.3.2.1) Plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following requirements, as shown in Table 601.3.2.1 (6.3.2.1) USEPA WaterSense performance criteria.

- a. **Water closets (toilets)—flushometer valve type.** For single-flush, maximum flush volume shall be determined in accordance with ASME A112.19.2/CSA B45.1 and shall not exceed 1.28 gal (4.8 L). For dual-flush, the full-flush volume shall not exceed 1.28 gal (4.8 L) per flush. Dual-flush fixtures shall also comply with the provisions of ASME A112.19.14.
- b. **Water closets (toilets)—tank-type.** Tank-type water closets shall be certified to the performance criteria of the USEPA WaterSense Tank-Type High-Efficiency Toilet Specification and shall have a maximum full-flush volume of 1.28 gal (4.8 L). Dual-flush fixtures shall also comply with the provisions of ASME A112.19.14.
- c. **Urinals.** Maximum flush volume, when determined in accordance with ASME A112.19.2/CSA B45.1, shall not exceed 0.5 gal (1.9 L). Flushing urinals shall comply with the performance criteria of the USEPA WaterSense Specification for Flushing Urinals. Nonwater urinals shall comply with ASME A112.19.19 (vitreous china) or IAPMO Z124.9 (plastic) as appropriate.
- d. **Public lavatory faucets.** Maximum flow rate shall not exceed 0.5 gpm (1.9 L/min) when tested in accordance with ASME A112.18.1/CSA B125.1.
- e. **Public metering self-closing faucet.** Maximum water use shall not exceed 0.25 gal (1.0 L) per metering cycle when tested in accordance with ASME A112.18.1/CSA B125.1.
- f. **Residential bathroom lavatory sink faucets.** Maximum flow rate shall not exceed 1.5 gpm (5.7 L/min) when tested in accordance with ASME A112.18.1/CSA B125.1. *Residential* bathroom lavatory sink faucets shall comply with the performance criteria of the USEPA Water-Sense High-Efficiency Lavatory Faucet Specification.
- g. **Residential kitchen faucets.** Maximum flow rate shall not exceed 1.8 gpm (6.8 L/min) when tested in accordance with ASME A112.18.1/CSA B125.1. Kitchen faucets shall be permitted to temporarily increase the flow greater than 1.8 gpm (6.8 L/min) but shall not exceed 2.2 gpm (8.3 L/min) and must automatically revert to the established maximum flow rate of 1.8 gpm (6.8 L/min) upon physical release of the activation mechanism or closure of the faucet valve.
- h. **Residential showerheads.** Maximum flow rate shall not exceed 2.0 gpm (7.6 L/min) when tested in accordance with ASME A112.18.1/CSA B125.1. *Residential* showerheads shall comply with the performance requirements of the USEPA WaterSense Specification for Showerheads.
- i. **Residential shower compartment (stall) in dwelling units and guest rooms.** The allowable flow rate from all shower outlets (including rain systems, waterfalls, body sprays, and jets) that can operate simultaneously shall be limited to a total of 2.0 gpm (7.6 L/min). **Exception:** Where the area of a shower compartment exceeds 2600 in.2 (1.7 m²), an additional flow of 2.0 gpm (7.6 L/min) shall be permitted for each multiple of 2600 in.2 (1.7 m²) of floor area or fraction thereof.
- j. **Water-bottle filling stations.** *Water-bottle filling stations* shall be an integral part of, or shall be installed adjacent to, not less than 50% of all drinking fountains installed indoors on the premises.

**TABLE 601.3.2.2 (TABLE 6.3.2.1)
PLUMBING FIXTURES AND FITTINGS REQUIREMENTS**

PLUMBING FIXTURE	MAXIMUM
Water closets (toilets)	1.28 GPF
Urinals	0.5 GPF
Public lavatory faucets	0.5 GPM
Public metering self-closing faucet	0.25 gal per metering cycle
<i>Residential</i> bathroom lavatory sink faucets	1.5 gpm
<i>Residential</i> kitchen faucets	1.8 GPM
<i>Residential</i> showerheads	2.0 GPM

601.3.2.2 (6.3.2.2) Plumbing Fixtures and Fittings

a. *Clothes washers* and *dishwashers* installed within *dwelling units* shall comply with the ENERGY STAR® Program Requirements for Clothes Washers and ENERGY STAR Program Requirements for Dishwashers

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b. ~~2.~~

c. Commercial dishwashers in commercial food-service facilities shall meet all ENERGY STAR requirements as listed in the ENERGY STAR Program Requirements for Commercial Dishwashers, Version 2.0.

601.3.2.3 (6.3.2.3) HVAC Systems and Equipment

a. *Once-through cooling with potable water* is prohibited.

b. The water being discharged from cooling towers for air-conditioning systems such as chilled-water systems shall be limited in accordance with method (1) or (2):

1. For makeup waters having less than 200 ppm (200 mg/L) of total hardness expressed as calcium carbonate, by achieving a minimum of 5 *cycles of concentration*.

2. For makeup waters with more than 200 ppm (200 mg/L) of total hardness expressed as calcium carbonate, by achieving a minimum of 3.5 *cycles of concentration*.

Exception: Where the total dissolved solids concentration of the discharge water exceeds 1500 mg (1500 ppm/L) or the silica exceeds 150 ppm (150 mg/L) measured as silicon dioxide before the above *cycles of concentration* are reached.

c. Cooling towers and evaporative coolers shall be equipped with makeup and blowdown meters, conductivity controllers, and overflow alarms in accordance with the thresholds listed in Table 601.3.4.1B (6.3.4.1B). Cooling towers shall be equipped with efficient drift eliminators that achieve drift reduction to a maximum of 0.002% of the recirculated water volume for counterflow towers and 0.005% of the recirculated water flow for cross-flow towers.

d. *Building projects* located in regions where the ambient mean coincident wet-bulb temperature at 1% design cooling conditions is greater than or equal to 72°F (22°C) shall have a system for collecting condensate from air-conditioning units with a capacity greater than 65, 000 Btu/h (19 kW), and the condensate shall be recovered for reuse.

601.3.3 (6.3.3) Special Water Features. Water use shall comply with the following:

a. Ornamental fountains and other ornamental water features shall be supplied either by *alternate on-site sources of water* or by municipally reclaimed water delivered by the local water utility acceptable to the AHJ. Fountains and other features equipped with *automatic* water refilling valves shall be equipped with (1) makeup water meters (2) leak detection devices that shut off water flow if a leak of more than 1.0 gal/h (3.8 L/h) is detected, and (3) equipment to recirculate, filter, and treat all water for reuse within the system.

Exception: Where *alternate on-site sources of water* or municipally reclaimed water are not available within 500 ft (150 m) of the *building project site*, *potable water* is allowed to be used for water features with less than 10, 000 gal (38, 000 L) capacity.

b. Pools and spas:

1. Recover filter backwash water for reuse on landscaping or other applications, or treat and reuse backwash water within the system.

2. For filters with removable cartridges, only reusable cartridges and systems shall be used. For filters with backwash capability, use only pool filter equipment that includes a pressure drop gage to determine when the filter needs to be backwashed and a sight glass enabling the operator to determine when to stop the backwash cycle.

3. Pool splash troughs, if provided, shall drain back into the pool system.

601.3.5 (6.3.5) Water Softeners Water softeners shall comply with Sections 601.3.5.1 (6.3.5.1) through 601.3.5.4 (6.3.5.4).

601.3.5.1 (6.3.5.1) Demand-Initiated Regeneration Water softeners shall be equipped with demand-initiated regeneration control systems. Timer-based control systems shall be prohibited.

601.3.5.2 (6.3.5.2) Water Consumption During regeneration, water softeners shall have a maximum water consumption of 4 gal (15.1 L) per 1000 grains (17.1 g/L) of hardness removed, as measured in accordance with NSF 44.

601.3.5.3 (6.3.5.3) Waste Connections Waste water from water softener regeneration shall not discharge to reclaimed water collection systems and shall discharge in accordance with the *International Plumbing Code*.

601.3.5.4 (6.3.5.4) Efficiency and Listing Water softeners that regenerate in place, that are connected to the water system they serve by piping not exceeding 1¼ in. (31.8 mm) in diameter, or that have a volume of 3 ft³ (0.085 m³) or more of cation exchange media shall have a rated salt efficiency of not less than 4000 grains of total hardness exchange per pound of salt (571 grams of total hardness exchange per kilogram of salt), based on sodium chloride equivalency, and shall be listed and labeled in accordance with NSF 44. All other water softeners shall have a rated salt efficiency of not less than 3500 grains of total hardness exchange per pound of salt (500 grams of total hardness exchange per kilogram of salt), based on sodium chloride equivalency.

601.3.6 (6.3.6) Reverse Osmosis Water Treatment Systems Reverse osmosis systems shall be equipped with an *automatic* shutoff valve that prevents the production of reject water when there is no demand for treated water. Point-of-use reverse osmosis treatment systems for drinking water shall be listed and labeled in accordance with NSF 58.