

Draft Water-Efficient Single-Family New Home Specification

1.0 Scope and Objective

This specification establishes the criteria for water-efficient new homes under the United States EPA WaterSense® Program. It is applicable to newly constructed single-family homes and townhomes, three stories or less in size. A new home must meet all of the identified criteria to be labeled as a WaterSense home by a Builder Partner of the WaterSense Program.

The intent of this specification is to reduce indoor and outdoor water usage in new residential homes and encourage community infrastructure savings. This specification is not intended to contravene local codes and ordinances. Unless indicated, criteria for individual components do not constitute criteria for a WaterSense label for that component or product category. Individual component criteria are valid only in the context of this specification.

2.0 Summary of Criteria

New homes must meet criteria in three areas:

- Indoor water use including plumbing and plumbing fixtures and fittings, appliances, and other water using equipment;
- Outdoor water use including landscape design and irrigation systems, if installed; and
- Homeowner education.

3.0 Indoor Water Efficiency Criteria

- 3.1** Service Pressure – The static service pressure shall be 60 pounds per square inch (psi) (4.2 kilograms per square centimeter (kg/cm²)) or less. Compliance shall be achieved by use of a pressure-regulating valve (PRV) downstream of the water meter. All fixture connections shall be downstream of the pressure regulator.
- 3.2** Toilets – All toilets shall be WaterSense labeled high efficiency toilets.
- 3.3** Bathroom and Kitchen Faucets
- 3.3.1** All bathroom (lavatory) faucets shall be WaterSense labeled high efficiency faucets.
- 3.3.2** Water efficiency criteria have not been developed for kitchen faucets. These faucets shall comply with Federal standards for maximum flow rate of 2.2 gpm @ 60 psi (8.3 lpm @ 4.2 kg/cm²).
- 3.4** Showerheads – Water efficiency criteria have not yet been developed for showerheads. These showerheads shall comply with the 1992 EPAct standard for maximum flow rate of 2.5 gpm @ 80 psi (9.5 lpm @ 5.62 kg/cm²). Showers shall be equipped with an automatic compensating valve that complies with ASSE 1016 or

ASME A112.18.1/CSA B125.1 and specifically designed to provide thermal shock and scald protection at the flow rate specified above.

The total allowable flow rate from all showerheads flowing at any given time, including rain systems waterfalls, bodysprays, and jets, shall be limited to 2.5 gpm per shower compartment, where the floor area of the shower compartment is less than 2,500 in² (1.61 m²). For each increment of 2,500 in² (1.61 m²) of floor area thereafter or part thereof, additional showerheads with total allowable flow rate from all flowing devices equal to or less than the allowable flow rate specified above are allowed.

Exception: Recirculating showers.

These criteria will be revised after the release of the final specification for WaterSense labeled showerheads. A copy of EPA's notice of intent to develop draft performance specifications for showerheads and related devices can be found at http://www.epa.gov/watersense/docs/showerhead_noi508.pdf.

- 3.5** Hot Water Delivery System – All hot water pipes, both above and below ground, shall be insulated to a minimum of R4. In addition, each home shall be equipped with at least one of the features described below to minimize water loss in delivering hot water. Compliance will be measured through performance testing. The features described below can be combined as appropriate.
- 3.5.1** Demand-initiated hot water recirculating system - System should optimize both water and energy efficiency and shall be designed such that less than 0.13 gallons (0.49 liters) of water are in the piping between the recirculating loop and any hot water fixture.
 - 3.5.2** Whole house manifold system – System shall be designed such that less than 0.38 gallons (1.44 liters) of water are in the piping between the hot water source and any hot water fixture.
 - 3.5.3** Core plumbing system – System shall minimize pipe volume between the hot water source and any hot water fixture to 0.38 gallons (1.44 liters) or less.
- 3.6** Appliances – If the following types of appliances are offered, financed, installed, or sold as upgrades through the homebuilder, they shall meet these criteria:
- 3.6.1** Dishwasher – Dishwashers shall be ENERGY STAR® labeled.
 - 3.6.2** Clothes washer – Clothes washers shall be ENERGY STAR labeled with a water factor of less than or equal to 6.0 gallons of water per cycle per cubic foot capacity.

3.7 Other Equipment – If the following pieces of equipment are offered, financed, installed, or sold as upgrades through the homebuilder, they shall meet these standards:

3.7.1 Evaporative air conditioners – Shall use a maximum of 5 gallons (18.93 liters) of water per ton-hour of cooling when adjusted to maximum water use. Blow-down shall be based on time of operation, not to exceed 3 times in 24 hour period of operating (every 8 hours). Reservoir discharge outlet should be easily visible so the user can see when refill valve is leaking.

3.7.2 Water softeners – All devices shall be certified to meet the NSF/ANSI 44 standard. All water softeners shall be demand-initiated regeneration. If the device uses an ion exchange technology, it shall be capable of using potassium rather than sodium salt. Devices that use auto-initiated regeneration (fixed schedule) do not meet this specification.

3.7.3 Drinking water treatment systems – Drinking water treatment systems must be certified to meet applicable NSF/ANSI certifications. Such systems shall have an efficiency rate of not less than 85 percent.

4.0 Outdoor Water Efficiency Criteria

4.1 Landscape – The goal of the water-efficient landscape criteria is to reduce or obviate the need for supplemental irrigation. EPA has developed two options for designing the landscape of WaterSense labeled new homes, builders shall choose and implement one of the options. Option 1 provides a turf allowance and Option 2 allows the builder/landscape professional to design a landscape that is sustainable with a specified amount of water, i.e., a water budget.

The entire yard shall be landscaped to meet the criteria in either option.

4.1.1 Landscape Design

4.1.1.1 Option 1 – Turf shall not exceed 40% of the landscapable area.
Turf shall not be installed on slopes greater than 4:1.

4.1.1.2 Option 2 – Develop the landscape design using a water budget approach. The evapotranspiration (ET) limit on the landscapable area shall be no more than 60 percent of the reference ET (ET_o) for cool-season grass. For purposes of the ET calculation, the available precipitation shall be no more than 25 percent of the average annual rainfall amount. Turf shall not be installed on slopes greater than 4:1. Builders keeping a natural landscape that requires no supplemental irrigation would meet the requirements of this option.

- 4.1.2** Mulching – Non-turf, non-hardscape areas shall include a 2 to 3-inch layer of mulching material.
- 4.1.3** Pools/spas – If installed prior to owner occupancy, the water surface area shall be deducted from the turf allowance under Landscape Design Option 1 and included as landscapable area under Landscape Design Option 2.
- 4.1.4** Ornamental water feature – Builders shall not install or facilitate the installation of ornamental water features.
- 4.2** Irrigation System Design - Irrigation systems, if installed, shall meet the following criteria:
- 4.2.1** Design and Installation
- 4.2.1.1** All irrigation systems shall be designed, installed, and audited by a WaterSense Irrigation Partner. A listing of Irrigation Partners by State can be found at <http://www.epa.gov/watersense/pp/irrprof.htm>
- 4.2.1.2** Irrigation systems shall be designed to sustain the landscape without creating flow or spray that leaves the property during a minimum continuous operating duration. This will be measured during the irrigation audit and the minimum continuous operating durations shall be 7 minutes for pop-up, fixed-spray sprinklers; 10 minutes for subsurface irrigation; 10 minutes for flood bubblers; 20 minutes for rotor sprinkler heads; and 30 minutes for drip irrigation.
- 4.2.1.3** Sprinkler heads shall not be used to water plantings other than maintained turf grass.
- 4.2.1.4** Microirrigation shall be used for planting beds and turf installed in strips of less than 8 feet wide.
- 4.2.2** Irrigation Controller
- Irrigation controllers shall contain the following features:
- Multiple programming capabilities – shall be capable of storing a minimum of 3 different programs to allow for separate schedules.
 - Multiple start times (cycling, cycle/soak, stackable start times) – shall be capable of a minimum of 3 different start times to allow for multiple irrigation cycles on the same zone for areas prone to run off.
 - Variable run times – shall be capable of varying run times, for example from 1 minute to 1 hour.

- Variable scheduling – shall be capable of interval scheduling (minimum of 14 days) to allow for watering on even day scheduling, odd day scheduling, calendar day scheduling, and interval scheduling.
- Percent adjust (water budget) feature – shall include a “Percent Up/Down Adjust” feature (or “Water Budget” feature) such as a button or dial that permits the user to increase or decrease the run-times or application rates for each zone by a prescribed percentage, by means of one adjustment without modifying the settings for that individual zone.
- Capability to accept external soil moisture and/or rain sensors.
- Non-volatile memory or self-charging battery circuit.
- Complete shut off capability for total cessation of outdoor irrigation.

These criteria will be revised if and when EPA develops a final specification for weather-based or sensor-based irrigation control technology. Information on the development of a draft specification for these technologies can be found at <http://www.epa.gov/watersense/specs/controltech.htm>.

- 4.2.3** Sprinkler Heads – Sprinkler heads shall have a 4 inch or greater pop-up height and matched precipitation nozzles.
- 4.2.4** Microirrigation Systems – At a minimum, microirrigation systems shall be equipped with pressure regulators, filters, and flush end assemblies.
- 4.2.5** Schedule – Two seasonal water schedules shall be posted at the controller. One schedule shall be designed to address the initial grow-in phase of the landscape and the second schedule shall be designed to address an established landscape.

5.0 Homeowner Education

- 5.1** Operating Manual – The builder shall develop and provide to the homebuyer a written operating and maintenance manual for all water-using equipment or controls installed in the house or yard. If clothes washers or dishwashers are not provided, information about water-efficient appliances shall be included.

6.0 Definitions

Core plumbing system – Hot water distribution system where water volumes in the pipes are reduced by a combination of smaller pipe diameters and shorter pipe runs due to a centrally located water heater.

Demand-initiated recirculating hot water delivery system – Recirculating hot water delivery systems use a pump to rapidly move water from a water heater to the fixtures. In this system, a recirculating pump rapidly pulls hot water from a water heater while simultaneously sending cooled-off water from the hot water lines back to the water heater to be reheated. Demand-initiated hot water recirculation systems can be activated by the push

of a button or motion sensor. Hot water recirculation systems generally consist of a pump, an integrated electronic controller, and a zone valve. When the activation button is pushed, the pump starts recirculating cooled water that's been sitting in the hot water line and sends it back to the water heater through a dedicated return line or the cold water line. When the water reaches a desired temperature a control closes the zone valve and turns off the pump. It is much like turning on the hot water faucet and letting the water run until it gets hot, but instead of the water going down the drain it is simply returned back to the water heater. When the hot water faucet is turned on, hot water is readily available.

ENERGY STAR dishwashers – A listing of these dishwashers can be found at http://www.energystar.gov/index.cfm?c=dishwash.pr_dishwashers

ENERGY STAR clothes washers – A listing of these clothes washers can be found at http://www.energystar.gov/index.cfm?c=clotheswash.pr_clothes_washers

ET limit (ET_o) - ET_o is defined as the reference evapotranspiration rate from an extensive, uniform surface of dense, actively growing, cool-season grass with an approximate height of 4.7 inches and that is not short of soil water. Calculation of ET values should be performed using generally accepted equations and methods such as the ASCE Standardized Reference Evapotranspiration Equation (American Society of Civil Engineers, 2005). The Irrigation Association lists sources of ET information at http://www.irrigation.org/gov/default.aspx?r=1&pg=et_connection.htm

Evaporative air conditioners – Also called “swamp coolers” cool the air using water evaporation. There are two types of evaporative coolers: direct and indirect (all called two-stage). In a direct evaporative cooler, a blower forces air through a permeable, water-soaked pad. As the air passes through the pad, it is filtered, cooled, and humidified. An indirect evaporative cooler has a secondary heat exchanger which prevents humidity from being added to the airstream which enters the home. Cooling systems are defined by the temperatures they can “hold” either in the space and/or the process or equipment, and the amount of heat they can remove at full capacity. This heat removal is normally expressed in tons of cooling (or refrigeration) capacity. One ton of cooling equals precisely 12,000 Btu heat removal per hour (abbreviated Btu/h) and comes from the way air handlers were originally rated -- that is, how many pounds of ice would have to be loaded into them to provide the required space cooling. When melting, ice gives up 144 Btu per pound. Therefore, one ton of cooling provides the same amount of cooling energy as melting one ton of ice in 24 hours.

Hardscape – The part of a house's grounds consisting of structures, such as patios, decks, retaining walls, and walkways, made with hard materials.

Landscapable area – The area of a site less the building area, driveways, paved walkways, pools and spas, natural water features, and hardscapes such as decks and patios.

Manifold system – Also called parallel pipe or home run systems have a manifold connected to the water heater from which individual pipes are connected to each water fixture.

Microirrigation system – The application of small quantities of water directly on or below the soil surface, usually as discrete drops, tiny streams, or miniature sprays through emitters placed along the water delivery pipes (laterals). Microirrigation encompasses a number of low-flow, low-volume irrigation systems with any type of emission device, including surface drip irrigation systems, subsurface drip irrigation systems, and pop-up surface microirrigation systems. These systems shall have flow rates of no more than 25 gallons per hour.

Mulching material – Covering placed around plants to reduce water loss and erosion, and to help regulate soil temperature. Permeable artificial turf is considered to meet this definition.

Ornamental water feature – Includes fountains, ponds, waterfalls, man-made streams and other decorative water-related constructions provided solely for aesthetic or beautification purposes.

Recirculating shower – Showers designed to recirculate the water used in a shower by pumping water captured in a basin through the shower system. Most of these systems are designed to be switched on after initial cleaning is performed using a conventional showerhead and may include a filtering process.

Sprinkler head – A component in an irrigation system where pipes are buried underground. Sprinkler heads are spaced at desired intervals to deliver the water. Pop-up sprinkler heads pop-up when the water is on and recess into the ground when the water flow is off.

Static water pressure – The pipeline or municipal water supply pressure when water is not flowing.

Water budget – A water budget is used to calculate the amount of water a landscape needs taking into account the inputs and outputs of water to and from the root zone. Inputs, such as precipitation, are subtracted from outputs, such as evapotranspiration, to calculate the water needs of the landscape. Many factors are taken into consideration when calculating a water budget, such as plant type and irrigation system efficiencies. Specific methodology and worksheets will follow the release of this draft specification. Methodology will be based on the Irrigation Association's "Landscape Irrigation Scheduling and Water Management."

WaterSense bathroom (lavatory) faucets – These faucets have a flow rate that does not exceed 1.5 gallons per minute (gpm) (5.7 liters per minute) at a pressure of 60 psi (4.2 kg/cm²) at the inlet, when water is flowing; and is not less than 0.8 gpm (3.0 liters per minute) at a pressure of 20 psi (1.4 kg/cm²) at the inlet, when water is flowing. The specification can be found at http://www.epa.gov/watersense/specs/faucet_final.htm.

WaterSense high-efficiency toilets – These toilets have a flush volume that does not exceed 1.28 gallons (4.8 liters), a solid waste removal of 350 grams or greater, and conform to the adjustability and other supplementary requirements included in the specification. The specification can be found at <http://www.epa.gov/watersense/specs/het.htm> and a list of labeled toilet models can be found at http://www.epa.gov/watersense/pp/find_het.htm.

WaterSense irrigation partner – These professionals are certified through WaterSense labeled programs for their expertise in water-efficient irrigation technology and techniques. A

listing of Irrigation Partners by State can be found at
<http://www.epa.gov/watersense/pp/irrprof.htm>