



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF  
WATER

May 8, 2009

Dear Interested Party:

The U.S. Environmental Protection Agency (EPA) is pleased to announce the release of a revised draft specification for water-efficient single-family new homes. The purpose of this letter is to inform you of substantial changes made to the initial draft specification released in 2008, to share the rationale for making these changes, and to ask for your feedback.

Encouraging the construction of water-efficient new homes is the latest endeavor by EPA's voluntary WaterSense® program, launched in 2006 to protect the future of our nation's water supply by promoting water efficiency and enhancing the market for water-efficient products, services, and practices. WaterSense aims to change the way the American public and businesses think about their water use.

In May 2008, WaterSense released the draft specification for water-efficient single-family new homes for public comment and received substantial feedback. In the months since then, EPA has been taking steps to address stakeholder comments and provide additional resources to interpret the new homes specification. These tools include the following:

- Water budget tool: released in November 2008, which explains how builders shall comply with the draft specification's landscape design options;
- Inspection and irrigation audit guidelines: released in December 2008, which explain how the criteria outlined in the specification shall be verified and provides sample checklists for these tests; and
- New home certification system: released in December 2008, which explains the third party certification and labeling process for water-efficient single-family new homes. (Note: The certification system is in the process of being finalized and will not be released again for public comment.)

EPA welcomes your input on the revised draft Water-Efficient Single-Family New Home Specification, revised Water Budget Tool, and revised Inspection and Irrigation Audit Guidelines. All interested parties are encouraged to review the revised materials and provide written comments by July 7, 2009. Written comments should be directed to [watersense-newhomes@erg.com](mailto:watersense-newhomes@erg.com). All comments become a part of the public record.

Additionally, WaterSense will be conducting a public comment meeting in June 2009. Please check the WaterSense Web site ([www.epa.gov/watersense/pp/new\\_homes.htm](http://www.epa.gov/watersense/pp/new_homes.htm)) for additional information as it becomes available.

For a snapshot of the next steps to finalize the specification for single-family new homes and launch the upcoming WaterSense New Homes program, see the timeline below.

- June – Release the final New Home Certification System
- June – Hold public meeting on the revised draft specification
- July and August – Review public comments on the revised draft specification
- September and October – Recruit and train new home certification providers
- November – Release final specification for water-efficient single-family new homes and a list of WaterSense licensed providers.

If you have any questions, please contact Allison Hogge at (202) 564-0627 or [hogge.allison@epa.gov](mailto:hogge.allison@epa.gov), or the WaterSense Helpline at (866) 987-7367 or [watersense@epa.gov](mailto:watersense@epa.gov). We look forward to receiving your feedback on the specification.

Sincerely,

Sheila Frace  
Director,  
Municipal Support Division  
EPA's Office of Water

## **Significant Changes in the Revised Draft Specification and Related Materials**

In response to public comments, EPA has made both major and minor changes to all aspects of the draft specification for water-efficient single-family new homes. Significant changes to the indoor and outdoor water-efficiency criteria, homeowner education criteria, and water budget tool are listed here and described below.

The significant changes to the indoor water-efficiency criteria include:

- Eliminated the criterion that all hot water pipes be insulated;
- Revised the criterion for the performance of hot water delivery systems;
- Developed a criterion that all water-using fixtures, appliances, and equipment be checked for leaks; and
- Expanded the criterion for water softeners.

The significant changes to the outdoor water-efficiency criteria include:

- Revised the criterion that the entire yard be landscaped in all cases;
- Redefined “landscapable area;”
- Changed the water adjustment factor (Kwa) of 60 percent to an evapotranspiration adjustment factor (ETAF) of 70 percent;
- Revised the criterion for ornamental water features;
- Revised the criterion for designing, installing, and auditing irrigation systems;
- Developed a distribution uniformity criterion for irrigation systems; and
- Developed a criterion for the requirement of a rain shut-off device.

The significant changes to the homeowner education criteria include:

- Developed a criterion that builders provide homeowners with a drawing record (schematic) of the irrigation system, if installed.

The significant changes to the water budget tool include:

- Changed the timeframe from annual to peak watering month;
- Revised the landscape coefficients; and
- Revised the default irrigation system distribution uniformities.

### **Indoor Criteria – Insulation of Hot Water Pipes**

EPA received comments in support of and against the criteria that all hot water pipes be insulated to a minimum of R4. Research indicates that there are water and energy savings associated with the delivery of hot water through insulated pipes during concurrent draws. The insulation allows less heat to dissipate from the pipes and, therefore, hot water is delivered more quickly once the pipes are warmed from previous draws. EPA does believe that insulating hot water pipes located below-grade, below-slab, and in crawlspaces may be cost-effective in some climates. However, there is limited data supporting water savings from the delivery of hot water through insulated pipes when draws are not concurrent. Household water usage patterns indicate that hot water is typically used in the mornings and evenings and that many hot water draws might not be close enough together to benefit from the water savings associated with pipe insulation. Therefore, due to the limited water savings and high costs associated with pipe insulation, EPA has eliminated the criterion that all hot water pipes be insulated from the revised draft specification.

## **Indoor Criteria – Hot Water Distribution Systems**

EPA received many comments in favor of setting a single performance standard for hot water distribution systems instead of requiring the use of specific types of delivery systems. Although EPA believes that the three systems identified in the draft specification (demand-initiated hot water recirculating system, whole house manifold system, core plumbing system) will be used by builders in water-efficient homes, EPA agrees that developing a performance-based specification provides more flexibility to builders and accommodates more diverse floor plans.

EPA also received comments on required pipe sizes and the expected piping runs between hot water sources and the farthest plumbing fixtures. Based on these comments, EPA believes that revising its calculations to reflect increased pipe diameters and greater distances between hot water sources and fixtures will allow more builders to participate in the program while still achieving its objective that builders install water-efficient hot water delivery systems. Therefore, EPA determined that a maximum of 0.60 gallons of water stored in the piping between the hot water source and any hot water fixture would adequately accommodate the expected distances to fixtures from the hot water source (20 to 30 feet) and the combination of pipe sizes (e.g., 3/4-inch trunks, 1/2-inch branches) used to make the connections in a home. EPA also believes that specifying a performance standard of 0.60 gallons will alleviate concerns that builders will try to meet the criteria using too small a diameter of piping.

## **Indoor Criteria – Leaks**

Many commenters stated that EPA should require inspectors to check for leaks at all visible supply connections and valves. EPA agreed that inspectors should be looking for leaks during their inspection and, therefore, included a requirement in the revised draft specification that there be no visible leaks from any water-using fixtures, appliances, or equipment. Based on comments from pilot builders and their inspectors, EPA believes that there should not be any increased cost for inspectors to look for leaks as they verify the fixtures, appliances, and other equipment installed in the home.

## **Indoor Criteria – Water Softeners**

During the past year EPA has been conducting additional research on water-efficient water softeners and determined that water softeners are common in regions of the country where hard water is prevalent, with cation-exchange water softeners being the most common and most reliable technology.

While the volume of water consumed by these softeners has decreased significantly in recent years, water softeners still generate and discharge a significant volume of wastewater. To minimize water consumption and reduce the amount of salt discharged into septic and sewer systems, the NSF/ANSI Standard 44–Residential Water Softener Testing and the Water Quality Association’s (WQA) S-100 Residential Water Softener Testing Standard include a voluntary set of requirements for efficiency-rated residential cation-exchange water softeners. All residential cation-exchange water softeners sold in the United States must be certified to the general requirements of NSF/ANSI Standard 44 (or WQA S-100). The voluntary efficiency requirements found in Section 7 of NSF/ANSI Standard 44 are for manufacturers looking to differentiate and market their products as water- and salt-efficient.

WaterSense also received comments recommending that EPA require only demand-initiated regeneration water softeners because they use auto-initiated regenerations initiated via a water meter or water hardness sensor that reduce the amount of wastewater generated. In contrast, devices using time-clock-initiated regenerations discharge regardless of the amount of water that has been treated and regardless of the amount of treatment capacity that may be remaining in the unit. WaterSense also received comments against the use of salt-based softeners. Based on the new research and these comments, EPA believes that NSF/ANSI Standard 44 voluntary requirements for efficiency-rated residential cation-exchange water softeners identifies and designates models that use water and salt efficiently and that incorporate the desirable demand-initiated regeneration technology. Therefore, EPA has incorporated the NSF/ANSI voluntary efficiency requirements into the revised draft specification.

### **Outdoor Criteria – Landscaping the Yard**

WaterSense received comments arguing against a uniform requirement that the entire yard be landscaped. Commenters believed this requirement would greatly reduce the potential for builders to participate in WaterSense in markets where the prevailing practice is to landscape only the front yard of new homes. To research this issue further, EPA conducted telephone focus groups of various sizes with 40 builders across the country to discuss their standard landscaping and irrigating practices. Based on this research and other conversations with builders and developers, EPA determined that most builders landscape the front of the house using primarily turfgrass. Although custom homebuilders tended to landscape the entire yard more often than larger builders, there did not appear to be any geographic link to the landscaping practices. EPA also learned that many builders do install irrigation systems in their landscapes.

To encourage maximum builder participation and to work within the current landscaping practices of most builders, EPA has revised the landscape design criteria to require that every home seeking the WaterSense label must landscape the front yard to meet WaterSense criteria. However, to address builders who are landscaping the entire yard as part of their standard package or are installing pools, spas, water features, and/or irrigation systems, EPA is requiring that the entire yard be landscaped to meet WaterSense criteria in these instances.

WaterSense also received comments on setting a minimum lot size for the landscape design criteria. EPA agrees that on very small lots, such as those associated with some townhomes, it would be difficult to allow for a useable amount of turfgrass and still meet the landscape design criteria. Therefore, EPA has exempted lots with less than 1,000 square feet of landscapable area from the landscape design criteria.

### **Outdoor Criteria – Definition of Landscapable Area**

EPA also revised the definition for “landscapable area.” Since the release of the first draft of the specification, WaterSense has received numerous comments on areas of the lot that should or should not be subject to the landscape design criteria. EPA agrees that the definition should exclude areas designated as rights-of-way, drainage or utility easements, and septic drainfields. Therefore, EPA conducted research on definitions used by other green building programs to see if they had addressed these areas of concern. EPA believes that the definition included in this revised draft specification (i.e.,

“buildable lot area excluding area under roof”), which is based on the U.S. Green Building Council’s (USGBC’s) Leadership in Energy and Environmental Design (LEED) for Homes program’s definition of the “designed landscape”, is simple and sufficiently broad to address the long list of non-buildable areas that may be encountered at a given site.

### **Outdoor Criteria – Ornamental Water Features**

EPA received hundreds of comments on the beneficial uses of water features commonly installed in homes and conducted several conference calls with key stakeholders representing this industry to better understand the type of water features installed in new homes. Many commenters recommended that EPA treat water features in the same manner as pools and spas. EPA has revised the criteria to allow the installation of ornamental water features that recirculate water and serve a beneficial use. EPA believes that this requirement helps differentiate closed system water features that contain and recirculate water from those features that are less efficient. The revised draft specification also requires that the water surface areas of the water features be deducted from the turfgrass allowance and included as landscapable area under the landscape design options, which is also the requirement for pools and spas.

### **Outdoor Criteria – Plantings on Slopes**

Due to the runoff concerns associated with irrigating turfgrass installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1), the first draft specification stated that turf shall not be planted on slopes greater than 4:1. However, as many commenters identified, EPA did not specify what, if anything, should be planted on the slopes. EPA’s intent was that the slope would be planted and not left bare. Therefore, EPA has revised the criteria in the specification to state “non-irrigated plantings other than turfgrass shall be installed on slopes in excess of 4 feet of horizontal run per 1 foot vertical rise (4:1).”

### **Outdoor Criteria – Design, Installation, and Auditing of Irrigation Systems**

EPA received many comments arguing against the use of WaterSense irrigation partners to design, install, and audit irrigation systems installed at homes seeking the WaterSense label. These commenters believe that there are other qualified individuals who can design and install water-efficient irrigation systems and some questioned the availability of WaterSense irrigation partners. EPA agrees that there are other individuals that can install water-efficient irrigation systems that meet the criteria for WaterSense labeled new homes. EPA also believes that through existing partnerships and use of local irrigation professionals, builders may be able reduce the costs associated with designing and installing irrigation systems. Therefore, EPA has eliminated the requirement that all irrigation systems be designed and installed by WaterSense irrigation partners. However, to ensure that the installed systems meet WaterSense criteria, EPA has retained the requirement that a WaterSense irrigation partner must audit each irrigation system.

## **Outdoor Criteria – Irrigation Systems Achieve Specified Distribution Uniformity**

EPA received several comments recommending that EPA require a specific uniformity standard or efficiency percentage for the irrigation system. Suggested distribution uniformity values ranged from 60 to 75 percent. EPA agrees with the commenters and added a criterion to the revised draft specification that the irrigation system shall achieve a lower quarter distribution uniformity ( $DU_{LQ}$ ) value of 70 percent to help ensure the system is operating efficiently at the time of installation.

## **Outdoor Criteria – Irrigation Systems Interrupted During Rainfall**

EPA received numerous comments recommending that EPA require irrigation systems to be equipped with technology that inhibits or interrupts operation during rainfall. EPA agrees that equipping irrigation systems with devices to stop operation during periods of rainfall will reduce the amount of water wasted during landscape irrigation. Rain sensors can be purchased quite inexpensively, therefore, EPA does not believe this requirement will add significantly to the costs of the irrigation system.

## **Homeowner Education Criteria – Information on Irrigation Systems**

Homes that are labeled under the WaterSense program are certified to meet water-efficiency criteria at the time of inspection. EPA understands that after homeowners move into WaterSense labeled homes, keeping the homes water-efficient will require maintenance, especially with respect to irrigation systems. To help educate homeowners on the irrigation systems installed in their homes, EPA is requiring that builders provide the homebuyer with a schematic of the system and copies of the two irrigation schedules developed for their system. The WaterSense materials on efficient indoor and outdoor water use shall also be provided to homeowners.

## **Water Budget Tool – Required Use**

Due to concerns raised by commenters about inconsistent approaches used to calculate a water budget, EPA is requiring the use of the WaterSense water budget tool if the builder selects Option 2 to fulfill the landscape design criterion.

## **Water Budget Tool – Peak Watering Month**

EPA received many comments recommending that the tool be based on a peak watering month instead of an annual timeframe in order to better reflect the conditions during the growing season, which is the period of time when plants need the most water and precipitation is utilized by the landscape. The annual timeframe did not discern between forms of precipitation, such as snow and rain, and allowed natural water falling outside of the growing season to be incorporated into the budget. To address these concerns, EPA revised the timeframe to the peak watering month, which is consistent with other water budget tools used around the country, including USGBC's LEED for Homes water budget tool. Users will base evapotranspiration and rainfall data on the peak month for their area.

## **Water Budget Tool – Water Adjustment Factor**

EPA received a number of comments in support of different water adjustment factors ( $K_{wa}$ ). Some stakeholders expressed concern that a 60 percent adjustment factor would limit the use of native plants in certain regions of the country and/or would not allow the landscape to survive. To address these concerns, EPA has increased this factor to 70 percent. Additionally, EPA is clarifying the use and intent of the water adjustment factor, now called the evapotranspiration adjustment factor (ETAF). The intent is not that all areas of the landscape can only be watered at 70 percent of the local reference evapotranspiration ( $ET_0$ ). The intent is that the landscape should be designed so that, as a whole, it requires 70 percent of the amount of water that a similar-sized lot composed entirely of turfgrass would require. A variety of high, medium, and low water-using plants, as well as nonirrigated areas, can be used in the landscape to meet this requirement.

## **Water Budget Tool – Landscape Coefficients**

EPA received numerous comments on the use of landscape coefficients based on California data and the lack of local data for use in the “custom” areas of the tool. In addition, multiple commenters noted that there was no option to designate low water-using plants. After conducting additional research with various stakeholders, academics, and cooperative extension services around the country, EPA determined that this body of data and/or a single source of regional landscape coefficients for common species is not available. While efforts in the landscape community are being made to produce a clearinghouse for landscape coefficient data, EPA is moving forward by adopting the species factor values used in USGBC’s LEED for Homes Rating System Sustainable Sites Criteria 2.5 (2008). This table, based on the Water Use Classifications of Landscape Species published by the University of California Cooperative Extension, includes low, medium, and high water requirements for trees, shrubs, groundcover, and turfgrass. EPA is aware that these values are still based on California data, but believes this to be the best data currently available. EPA also eliminated the option of entering custom values until more landscape coefficient data is readily available for users.

## **Water Budget Tool – Run Time Multiplier, Irrigation Efficiency, and Distribution Uniformity Values**

EPA received multiple comments noting that the denominator of the run time multiplier should be “distribution uniformity,” instead of “irrigation efficiency.” EPA changed the terminology in the equations and in Table 3 to reflect this recommendation.

EPA also received comments that the irrigation efficiencies (now lower quarter distribution uniformity values) were too high. EPA addressed these concerns by lowering the distribution uniformities from the “Excellent” level to the “Very Good” level as listed in Table 1-8 and Table 1-9 of the Irrigation Association’s *Landscape Irrigation Scheduling and Water Management* (2005).

## **Inspection Guidelines**

EPA received multiple comments that the inspection guidelines should be updated to reflect changes to the specification and released again for public comment. EPA agrees with these commenters and has included updated inspection and irrigation audit guidelines with the revised specification.