Water Efficiency Rating Update

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US EPA WaterSense Program

EEBA High Performance Home Summit 2019
Denver, CO
October 2, 2019
RESNET is a non-profit organization founded in 1995

A national standards development organization recognized by ANSI for building energy and water efficiency rating and certification systems in the USA

Best known for the development and maintenance of the Home Energy Rating System (HERS), which is published as a US national standard

Created and maintains the Mortgage Industry National Home Energy Rating System Standards

Set the standards for certification of Home Energy Raters and Quality Assurance of HERS Ratings

HERS\textsubscript{H2O} Under Development by RESNET
Key Objectives for HERS$_{H2O}$

- Nationwide applicability (all climates)
- Suitable for both new and existing homes
- Encompasses both indoor and outdoor water efficiency
- Practical and affordable to administer
- Scores usable for quantitative comparison
Timeline of Initial Development

2015
- RESNET Board Approves Water Efficiency Initiative
- Advisory Council Formed

2016
- HERS\textsubscript{H2O} Working Group Formed
- HERS\textsubscript{H2O} Working Group Technical Subcommittees formed
- Initial work begins

2017
- Technical Guidelines Drafted and Underwent Public Review and Comment Process
- Inspection Checklist completed
- Inspection guidance doc drafted
- Planning for Field Testing of Technical Guidelines
- RESNET/ICC ANSI Standard Development Committee Formed
2018 and 2019 Activities

2018

• Guidelines approved by RESNET Board
• Development of ANSI Standard for a Water Rating Index (WRI)
  • Final Guidelines serve as base text for draft standard
  • Review of draft Standard by SDC
  • First Public Comment Period
  • Review/respond to Public Comments
• Development of HERS$_{\text{H2O}}$ Implementation Standards
  • Quality Assurance
  • Registry
  • Training
• 6 month pilot phase

2019

• Second round of public comments on Draft Standard
• Third round of public comments on Draft Standard
• Revisions to Inspection checklist and guidance document
• Development of HERS$_{\text{H2O}}$ training
• Finalize HERS$_{\text{H2O}}$ implementation standards
• Set up RESNET Registry to accept HERS$_{\text{H2O}}$ data
• Forward Final Standard to ANSI for approval
Update on Standard 850

- Numeric designation changed from Standard 1101 to Standard 850
- Appeals process pending
- Expect final standard to be forwarded to ANSI in late 2019 or early 2020
Technical Guidelines serve as the basis for the Water Rating Index Standard (BSR/RESNET/ICC 850-201x).
How do Standard 850 and HERS\textsubscript{H2O} Relate?

**BSR/RESNET/ICC Standard 850**
- Developed through an ANSI consensus-based process
- RESNET’s Standard Development Committee 850 is responsible for the development of this standard
- Technical subcommittee also provides recommendations
- Upon publication, available to be adopted by code development and adopting entities

**HERS\textsubscript{H2O}**
- RESNET program that will be based on Standard 850
- Additional program requirements to include:
  - Certification of raters
  - Accreditation of rating providers
  - Quality Assurance oversight
  - Approval of software
Introduction to HERS$_{H2O}$
Drought - Not the Only Driver for Water Efficiency Efforts

Map for August 16, 2018

Data valid: August 14, 2018 | Author: Richard Heim, NOAA/NCEI
Increases in Water & Sewer Costs

Water cost increases from 2000-2012:

1. Atlanta: 233%
2. San Francisco: 211%
3. Wilmington: 200%
4. Philadelphia: 164%
5. Portland: 161%
6. Wichita: 153%
7. New York: 151%
8. Waterloo, IA: 145%
9. Binghamton, NY: 143%
10. San Diego and Augusta: 141%
Basic Concept of a Rating

Reference Home

- Automatically generated by software
- Establishes baseline for comparison with the rated home
- Minimum requirements ~2006 construction practices for plumbing
- Scores ~100 on HERS$_{H2O}$ Index scale

Rated Home

- The “as-built” home
- Components entered by the Rater
- Each component that is more efficient than the reference home will reduce water use and Index score in the rated home.
- Less efficient components will do the opposite.
This Standard will provide a uniform methodology for evaluating, rating and labeling the indoor and outdoor water use performance of new and existing one- and two-family dwellings.
Ratable Features of a Rated Home

- Shower Heads
- Kitchen Faucet
- Lavatory Faucets
- Clothes Washer
- Toilet Flush Volume
- Water Softener
- Leaks/Other Water Use
- Excess Pressure
- Irrigation
- Pool or Spa
Other Attributes Included in the Rating

- House Size
- Geographic Location
- Number of Bedrooms
- Lot & Landscape Size
- Hot Water Distribution Layout
- Hot Water Pipe Insulation
Not Addressed (Yet) -- Rainwater and Gray Water

• Not addressed in the Standard

• Explanation included in the Forward

• Standards Committee decision:
  • Insufficient reliable data to quantify the impact of alternative water sources on a home’s potable water use

• Goal is to include in future revisions
Calculating the Index Score

\[ HERS_{H2O} \text{ Index} = \frac{\text{indoor and outdoor gpd for the rated home}}{\text{indoor and outdoor gpd for the reference home}} \times 100 \]
Rating Calculation Methodology

- Grounded in water use data as much as possible
- Indoor reference home based primarily on HERS
- Outdoor reference home based on Residential End Uses of Water Study
- Number of bedrooms used as predictor of occupancy
- Built upon ANSI/RESNET/ICC Standard 301-2014 and Addendum A
What Moves the Needle?

**Indoor model will respond to:**
- More efficient plumbing products
- Efficient Appliances
- More efficient pipe layout

**Outdoor model will respond to:**
- Smaller irrigated landscapes (the reference landscape is fixed based on lot size)
- More efficient irrigation technology
  - Smart controllers
  - More efficient emitters, as expressed by the Residential Irrigation Capacity Index (RICI)
### Calculation Spreadsheet

#### Indoor Use Calculation Fields

<table>
<thead>
<tr>
<th>User input fields are yellow</th>
<th>Water Use</th>
<th>Cold Wtr</th>
<th>Hot Wtr</th>
<th>Total Wtr</th>
<th>Home characteristics:</th>
<th>Drain Water Heat Recovery:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location (pull down)</td>
<td>Shower_gpd</td>
<td>7.0</td>
<td>17.1</td>
<td>24.1</td>
<td>CFA</td>
<td>all</td>
</tr>
<tr>
<td>Castle Rock, CO</td>
<td>Kitche_gpd</td>
<td>4.1</td>
<td>10.1</td>
<td>14.2</td>
<td>NBr</td>
<td>Equal flow? yes</td>
</tr>
<tr>
<td>Distribution system</td>
<td>Lav_gpd</td>
<td>1.8</td>
<td>4.5</td>
<td>6.4</td>
<td>NFr</td>
<td></td>
</tr>
<tr>
<td>std</td>
<td>Waste_gpd</td>
<td>4.5</td>
<td>11.2</td>
<td>15.7</td>
<td>Bsmnt</td>
<td></td>
</tr>
<tr>
<td>Shower (gpm)</td>
<td>CW_gpd</td>
<td>20.6</td>
<td>3.9</td>
<td>24.5</td>
<td>Trains =</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>DW_gpd</td>
<td>4.3</td>
<td>4.3</td>
<td>8.6</td>
<td>55.9</td>
<td></td>
</tr>
<tr>
<td>Kitch Faucet (gpm)</td>
<td>Toilets_gpd</td>
<td>21.9</td>
<td>21.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>Soft_gpd</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lau Faucet efficiency std</td>
<td>Other_gpd</td>
<td>1.57</td>
<td>2.1</td>
<td>17.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recirc sys pipe length std</td>
<td>EP_gpd</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>89</td>
<td>Indoor_gpd</td>
<td>75.7</td>
<td>53.2</td>
<td>128.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recirc sys loop length</td>
<td>Outdoor_gpd</td>
<td>67.8</td>
<td>0.0</td>
<td>67.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>159</td>
<td>Total_gpd</td>
<td>143.5</td>
<td>53.2</td>
<td>196.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DW heat recovery? no</td>
<td>Ref_In</td>
<td>75.7</td>
<td>53.2</td>
<td>128.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lot Area (ft2)</td>
<td>Ref_Out</td>
<td>67.8</td>
<td>0.0</td>
<td>67.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5,000</td>
<td>Ref_Total</td>
<td>143.5</td>
<td>53.2</td>
<td>196.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landscaped Area (ft2)</td>
<td>Save_Total</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,348</td>
<td>H2O_in</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>Sum of irrigation zone flow rates</td>
<td></td>
</tr>
<tr>
<td>% Outdoor H2O = 34%</td>
<td>H2O_Out</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>25.2</td>
<td></td>
</tr>
<tr>
<td>Ref_TR_Area = 2,348</td>
<td>H2O_Tot</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>Prof Audit? no</td>
<td></td>
</tr>
<tr>
<td>Tot_Ref_TR_Area = 47.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Static Pressure 90</td>
<td></td>
</tr>
<tr>
<td>Net_Uspc_ratio = 61.8%</td>
<td>HERS = 100</td>
<td>H2Osave* = 0</td>
<td></td>
<td>H2O Price</td>
<td>$3.90</td>
<td>S/CCF (1 CCF = 748.05 gallons)</td>
</tr>
<tr>
<td>Lot size (acres) = 0.115</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref std sys pipe length = 89.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ref recirc sys loop length = 158.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>* Gallons per year</td>
<td>$save** =</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>** $ per year</td>
<td>H2O Price</td>
<td>$3.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Outdoor Water Use

Outdoor Use calculation takes into account:

• Lot size
• Irrigated Area of rated home
• Location of the home (climate)
• Whether or not there is an automatic irrigation system
• Features of the irrigation system (weather-based controller, flow rates)
• Presence or absence of a swimming pool or spa
What is RICI?

Residential Irrigation Capacity Index

- **Optional** method to quantify efficient outdoor water use
- An index within an index
- Estimates irrigation use without knowledge of plantings
- Baseline RICI is set to 5 based on data
- Each 1-point reduction from baseline = 10% reduction in outdoor water use

\[
RICI\_rat = \frac{\text{sum of flow (gpm) of all irrigation valves}}{\text{square feet irrigated area}} \times 1,000
\]
Testing for RICI

Determine the irrigated area.
• Start with lot area
• Subtract the footprint of the home and any hardscaping
• Subtract any other areas that will not receive irrigation (artificial turf)

Determine Irrigation Flow Rates
• Turn off all fixtures and appliances
• Set irrigation controller to run each zone for a few minutes (equalize system)
• After the valve for a zone is fully opened and water emission devices are operating nominally, measure the flow rate for the zone by noting start reading of the meter, watch for 30 seconds, and multiply water used by 2
• Sum together flow rates for all zones, in gpm.
• Enter this number into the $\text{HERS}_{\text{H2O}}$ calculation spreadsheet
**Calculation Spreadsheet**

**Outdoor Water Use Calculation Fields**

<table>
<thead>
<tr>
<th>User input fields are yellow</th>
<th>Water Use</th>
<th>Cold Wtr</th>
<th>Hot Wtr</th>
<th>Total Wtr</th>
<th>Home characteristics</th>
<th>Drain Water Heat Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location (pull down)</td>
<td>Shower gpd</td>
<td>7.0</td>
<td>17.1</td>
<td>24.1</td>
<td>CFA</td>
<td>2400</td>
</tr>
<tr>
<td>Distribution system std</td>
<td>KitchF gpd</td>
<td>4.1</td>
<td>10.1</td>
<td>14.2</td>
<td>Nr</td>
<td>3</td>
</tr>
<tr>
<td>HW pipe insulation none</td>
<td>LavF gpd</td>
<td>1.8</td>
<td>4.5</td>
<td>6.4</td>
<td>Nf</td>
<td>2</td>
</tr>
<tr>
<td>Shower (gpm) 2.5</td>
<td>Waste gpd</td>
<td>4.5</td>
<td>11.2</td>
<td>15.7</td>
<td>Bsmnt</td>
<td>0</td>
</tr>
<tr>
<td>Kitch Faucet (gpm) 2.2</td>
<td>CW gpd</td>
<td>20.6</td>
<td>3.9</td>
<td>24.5</td>
<td>Tmain =</td>
<td>55.9</td>
</tr>
<tr>
<td>Lav Faucet efficiency std</td>
<td>DW gpd</td>
<td>4.3</td>
<td>4.3</td>
<td>8.6</td>
<td>Appliance</td>
<td>WhIn = 0.00</td>
</tr>
<tr>
<td>Std sys pipe length 89</td>
<td>Toilets gpd</td>
<td>21.9</td>
<td>21.9</td>
<td></td>
<td>Dishwasher</td>
<td>std</td>
</tr>
<tr>
<td>Recirc sys loop length 159</td>
<td>Soft gpd</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>Clothes washer std</td>
<td>Wf</td>
</tr>
<tr>
<td>Recirc sys branch length 10</td>
<td>Other gpd</td>
<td>15.7</td>
<td>2.1</td>
<td>17.8</td>
<td>Toilets</td>
<td>gpf 1.6</td>
</tr>
<tr>
<td>Recirc pumpWatts 50</td>
<td>EP gpd</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>Water Softener no</td>
<td>gpf 0</td>
</tr>
<tr>
<td>DW heat recovery no</td>
<td>Indoor gpd</td>
<td>75.7</td>
<td>53.2</td>
<td>128.9</td>
<td>Inground Pool no</td>
<td>gallons/1,000 grains removed</td>
</tr>
<tr>
<td>Lot Area (ft²) 5,000</td>
<td>Outdoor gpd</td>
<td>67.8</td>
<td>0.0</td>
<td>67.8</td>
<td>Irrigation no</td>
<td>no</td>
</tr>
<tr>
<td>Walls Area (ft²) 3,348</td>
<td>Total gpd</td>
<td>143.5</td>
<td>53.2</td>
<td>196.7</td>
<td>Smart controller no</td>
<td>no</td>
</tr>
<tr>
<td>% Outdoor H2O = 34%</td>
<td>Ref In =</td>
<td>75.7</td>
<td>53.2</td>
<td>128.9</td>
<td>Use RICI no</td>
<td>no</td>
</tr>
<tr>
<td>Ref_Tot = 2,348</td>
<td>Ref Out =</td>
<td>67.8</td>
<td>0.0</td>
<td>67.8</td>
<td>Zone flow rate = 25.2</td>
<td>no</td>
</tr>
<tr>
<td>Total REF Tota</td>
<td>Ref_Tot =</td>
<td>143.5</td>
<td>53.2</td>
<td>196.6</td>
<td>Prof Audit no</td>
<td>no</td>
</tr>
<tr>
<td>% In Landscape = 61.8%</td>
<td>H2O In =</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>Static Pressure = 90</td>
<td>no</td>
</tr>
<tr>
<td>Lot size (acres) 0.115</td>
<td>H2O Out =</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>H2Osave =</td>
<td>0</td>
</tr>
<tr>
<td>H2O Total = 100</td>
<td>H2Osav =</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>H2O Price = $3.90</td>
<td>$/CCF (1 CCF = 748.05 gallons)</td>
</tr>
</tbody>
</table>

- Estimating Irrigation Impact. Only need: Lot area, landscaped area and “yes” for irrigation
- Smart controller and Professional Audit are optional
- Only enter zone flow rates when “yes” is selected for RICI (documentation provided)
WaterSense Labeled Homes
WaterSense Labeled Homes

Voluntary partnership and labeling program launched by EPA in 2006.

Simple way for consumers to identify products that use less water and perform well.
WaterSense Labeled Homes

WaterSense Labeled Products

- **Flushometer-Valve Toilets**: 1,400 labeled models
- **Spray Sprinkler Bodies**: 190 labeled models
- **Tank-Type Toilets**: 3,800 labeled models
- **Showerheads**: 8,900 labeled models
- **Lavatory Faucets**: 17,900 labeled models
- **Irrigation Controllers**: 800 labeled models
- **Flushing Urinals**: 700 labeled models

Labeled products are listed at:

[www.epa.gov/watersense/products/index.html](http://www.epa.gov/watersense/products/index.html)
The WaterSense label is available to

- Single-family homes and townhomes

- Residential units in multi-family buildings three stories or less in size

- Residential units in multi-family buildings of any size, that have independent heating, cooling, and hot water systems
  - Includes mixed-use buildings
  - Units in buildings with central hot water can qualify if at least 50% of the energy consumed for domestic hot water comes from an alternative source
Important Terminology

• **Home Certification Organization (HCO)**
  • Organizations responsible for establishing the specific requirements and overseeing the certification and labeling of homes for WaterSense
  • Similar to a Program Administrator or Verification Oversight Organization (VOO)

• **WaterSense Approved Certification Method (WACM)**
  • Methodology and verification protocol that homes can comply with to demonstrate adherence to WaterSense’s technical requirements
  • Administered (and possibly developed by) an HCO

• **Designee**
  • An organization such as a provider or other organization to whom the HCO has designated specific certification responsibilities and is capable of adhering to WaterSense’s certification requirements
  • An HCO may choose to designate many of the responsibilities associated with certification

• **Verifier**
  • Individual responsible for inspecting or rating a home to a specific WACM
  • Analogous to a Water Efficiency Home Inspector, “WaterSense rater”, or an energy rater
WACM
(WaterSense Approved Certification Method)

HERS$_{H2O}$ would become a WACM when approved by WaterSense. The purpose of WACMs is to:

1. Provide a method of calculating water efficiency in a home.
   - There may be more than WACM available in the future

2. Ensure that the methods used to achieve 30% efficiency are regionally appropriate.
   - Each WACM will have different characteristics that achieve the 30% efficiency.
Technical Requirements

Homes must meet two main requirements to be eligible to earn the WaterSense label:

1. Comply with all items on a mandatory checklist
2. Be at least 30% more water efficient than typical new construction
   • The 30% efficiency would be determined by the WACM.
## MANDATORY CHECKLIST FOR WATERSENSE LABELED HOMES

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirements</th>
<th>Confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaks</td>
<td>Pressure-loss test on all water supplies detected no leaks</td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td></td>
<td>Free of visible leaks from hot water delivery system</td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td></td>
<td>Free of visible leaks from toilet(s), as determined through visual assessment and by conducting a dye tablet test in each toilet to ensure the flapper is not leaking</td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td></td>
<td>Free of visible leaks from bathroom faucet(s)</td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td></td>
<td>Free of visible leaks from showerhead(s)</td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td></td>
<td>Free of visible leaks from bathroom tub faucet(s), i.e., tub spout(s), when showerhead(s) is activated, as determined through visual assessment after showerhead has been activated for one minute</td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td></td>
<td>Free of visible leaks from kitchen and other sink faucet(s)</td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td></td>
<td>Free of visible leaks from other fixtures or appliances (e.g., clothes washers, dishwashers, hose bibs, irrigation systems) at point of use or point of connection to water distribution system</td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td>Toilets</td>
<td>WaterSense labeled</td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td>Bathroom sink faucets</td>
<td>WaterSense labeled</td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td>Showerheads</td>
<td>WaterSense labeled</td>
<td>□ Yes □ No</td>
</tr>
</tbody>
</table>
What About Outdoors?

- Outdoor requirements don’t appear on the checklist, but *this doesn’t mean they aren’t included in the program*
  - It will be virtually impossible for many homes to meet the requirements without substantial outdoor efficiency measures
- It is difficult to identify outdoor measure that meet the checklist’s goals for
  - Universal applicability
  - Minimal incremental cost
  - Focus on quality-performance
Efficiency Requirements

• Homes must be at least 30% more efficient than typical new construction
  • Presumably, this would mean a HERS_{H2O} rating of 70 or less
  • WaterSense based this number on analysis of typical features, common efficiencies measures, and potential impacts across different climates
# Example of Climate Differences

| Lot: 5,000 ft² | House: 2,400 ft², 3 bedroom, 2 floors | Landscape: 2,348 ft² with automatic irrigation |

<table>
<thead>
<tr>
<th></th>
<th>Duluth, MN</th>
<th>Phoenix, AZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual water use</td>
<td>~60,000 gallons</td>
<td>~140,000 gallons</td>
</tr>
<tr>
<td>Indoor water use</td>
<td>~80%</td>
<td>~33%</td>
</tr>
<tr>
<td>Water savings from installing WaterSense labeled plumbing products</td>
<td>~10%</td>
<td>~4%</td>
</tr>
<tr>
<td>Approaches to achieve 30 percent reduction</td>
<td>Both indoor and outdoor improvements</td>
<td>MUST make substantial outdoor improvements</td>
</tr>
</tbody>
</table>
Indoor Water Use  
Target Score=70

<table>
<thead>
<tr>
<th>Location</th>
<th>WaterSense 2.0 Requirements (Homes Checklist)</th>
<th>Energy Star Clothes Washer and Dishwasher</th>
<th>1.5 gpm Shower and Kitchen</th>
<th>Toilet @ 0.8 gpf</th>
<th>Eff. Hot Water Distribution</th>
<th>Best Available Clothes Washer &amp; Dishwasher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park City, UT</td>
<td>93</td>
<td>88</td>
<td>81</td>
<td>77</td>
<td>73</td>
<td>69</td>
</tr>
<tr>
<td>Phoenix, AZ</td>
<td>96</td>
<td>92</td>
<td>92</td>
<td>86</td>
<td>83</td>
<td>81</td>
</tr>
<tr>
<td>Tampa, FL</td>
<td>93</td>
<td>87</td>
<td>79</td>
<td>76</td>
<td>71</td>
<td>67</td>
</tr>
<tr>
<td>Denver, CO</td>
<td>94</td>
<td>89</td>
<td>83</td>
<td>80</td>
<td>76</td>
<td>73</td>
</tr>
<tr>
<td>Riverside, CA</td>
<td>95</td>
<td>90</td>
<td>84</td>
<td>84</td>
<td>78</td>
<td>75</td>
</tr>
</tbody>
</table>
### Outdoor Water Use in HERS$_{H2O}$

<table>
<thead>
<tr>
<th>Location</th>
<th>Irrigation = “YES”</th>
<th>Prof. Audit &amp; Weather-based controller</th>
<th>20% Reduction in Irrigated Area</th>
<th>Use RICI (6 gpm all zone flow rates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park City, UT</td>
<td>77</td>
<td>68</td>
<td>62</td>
<td>56</td>
</tr>
<tr>
<td>Phoenix, AZ</td>
<td>86</td>
<td>73</td>
<td>63</td>
<td>55</td>
</tr>
<tr>
<td>Tampa, FL</td>
<td>75</td>
<td>67</td>
<td>61</td>
<td>56</td>
</tr>
<tr>
<td>Denver, CO</td>
<td>80</td>
<td>70</td>
<td>62</td>
<td>56</td>
</tr>
<tr>
<td>Riverside, CA</td>
<td>82</td>
<td>71</td>
<td>63</td>
<td>56</td>
</tr>
</tbody>
</table>
Impact of Irrigation Choices on HERS H2O

- Total Lot Size: 5,000 sq. ft.
- Reference Irrigated Area: 2,348 sq. ft.
- Indoor set to WaterSense 2.0 Requirements.

<table>
<thead>
<tr>
<th>Location</th>
<th>WaterSense 2.0 Requirements (Homes Checklist)</th>
<th>Ref. Irr Area &amp; 25% Flow Reduction (8.8 gpm all zones as per RICI)</th>
<th>Ref. Irr Area &amp; 50% Flow Reduction (5.9 gpm all zones as per RICI)</th>
<th>Reduce Irrigated Area by 20% and Add Weather-based Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park City, UT</td>
<td>93</td>
<td>89</td>
<td>84</td>
<td>75</td>
</tr>
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<td>Phoenix, AZ</td>
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<tr>
<td>Riverside, CA</td>
<td>95</td>
<td>89</td>
<td>82</td>
<td>71</td>
</tr>
</tbody>
</table>
HERS_{H2O} Inspection Process
### Two Inspection Resources

- **Inspection Checklist**
- **Inspection Guidance Document**

<table>
<thead>
<tr>
<th>Item</th>
<th>Section</th>
<th>Home Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Leaks</strong></td>
<td>1</td>
<td>Pressure-loss test on all water supplies detected no leaks.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No visible leaks from hot water delivery system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No visible leaks from tank type toilets from dye test.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No visible leaks from bathroom faucets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No visible leaks from kitchen faucets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No visible leaks from showerheads.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No visible leaks from other fixtures or appliances.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check meter with all systems off for system leak.</td>
</tr>
<tr>
<td><strong>Service Pressure</strong></td>
<td>2</td>
<td>Pressure tank installed and set ≤ 60 psi OR.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pressure Regulating Valve installed upstream of fixtures and pressure test ≤ 60 psi OR.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Written documentation from water supplier that pressure ≤ 60 psi OR.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On-site static pressure test: _____ psi.</td>
</tr>
<tr>
<td><strong>Hot Water</strong></td>
<td>3</td>
<td>Is there a hot water recirculation system present? If so, what type.</td>
</tr>
<tr>
<td><strong>Toilet</strong></td>
<td>4.1</td>
<td>Flush volume Marker*</td>
</tr>
<tr>
<td></td>
<td>4.1.1</td>
<td>Single Flush <strong>Flush Rate</strong> <strong>gpf</strong></td>
</tr>
<tr>
<td></td>
<td>4.1.2</td>
<td>Dual Flush <strong>Flush Rate</strong> <strong>gpf</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-water consuming toilet</td>
</tr>
<tr>
<td><strong>Bathroom sink faucet</strong></td>
<td>4.2</td>
<td>Flow Rate Marker* <strong>gpm</strong></td>
</tr>
<tr>
<td><strong>Kitchen sink faucet</strong></td>
<td>4.3</td>
<td>Flow Rate Marker* <strong>gpm</strong></td>
</tr>
<tr>
<td><strong>Showerhead</strong></td>
<td>4.4</td>
<td>Flow Rate Marker* <strong>gpm</strong></td>
</tr>
<tr>
<td><strong>Dishwasher</strong></td>
<td>4.5</td>
<td>Check for documentation of Water Factor.</td>
</tr>
<tr>
<td><strong>Clothes washer</strong></td>
<td>4.6</td>
<td>Check for documentation of Water Factor.</td>
</tr>
<tr>
<td><strong>Water softener</strong></td>
<td>4.7</td>
<td>Certified to NSF/ANSI Standard 44, including if available voluntary efficiency rated claim (stamped on data plate or indicated in the product manual).</td>
</tr>
<tr>
<td></td>
<td>4.7.1</td>
<td>Verify water hardness of area or conduct test.</td>
</tr>
</tbody>
</table>
• Stop watch/ cell phone timer
• Digital thermometer such as a digital food thermometer
• Pressure gauge
• Bucket or flow bag with volume measures marked
• Dye tablets for toilets
• Tape measure
• Water Hardness Tester
Typical Inspection Process - Indoor

It’s anticipated this will be done during a typical HERS rating final inspection

**Inspection Process:**

1. Put dye tablets in toilets
2. Verify flow rates of fixtures
3. Record make/model of dishwasher (if installed)
4. Record make/model of clothes washer (if installed)
5. Record make/model of water softener system (if installed)
6. Go back and check toilets for leaks (flush toilets to clear dye)
7. Verify flush rates stamped on toilets
8. Check house water pressure (or obtain documentation from builder)
Things to Note

- There is a mandatory training for raters.
- It will be available in RESNET’s training portal.
- The rating can usually be done in 45 minutes.
- They are working on opening the program to non-HERS raters.
Potential Impact
Popularity of HERS

2.4 Million HERS® Rated Homes and Counting!
23% of all new homes in 2017 were HERS Rated!

Credit: Dave Roberts, NREL
Can Scale Quickly

Over 1,900 Active RESNET Certified HERS Raters
Rating Field Inspectors By State

RED = ERI state

~800 RFIs
Interested Parties

Know someone interested in staying up to date on the water efficiency work of RESNET?

• Have them email Ryan Meres at ryan@resnet.us.
• Will receive periodic updates
• Notices of public comment periods and webinars
• Monthly “Water Update Newsletter”.
Thank you!

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