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WaterSense®

Creating a WaterSense Label for Efficient Landscape Sprinklers

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Background



WaterSense

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WaterSense is a voluntary program EPA launched in 2006 that provides a simple way to identify water-efficient:

- Products
- Programs
- Practices
- Homes

Products are independently certified for water efficiency and performance



WaterSense Labeled Products



**Irrigation
Controllers**



**Lavatory
Faucets**



**Flushing
Urinals**

**More than 20,000
WaterSense
Labeled
Product Models**



**Tank-Type
Toilets**



Showerheads



**Pre-rinse
Spray Valves**



**Flushometer-Valve
Toilets**



Water factors are also included in many ENERGY STAR® certified products

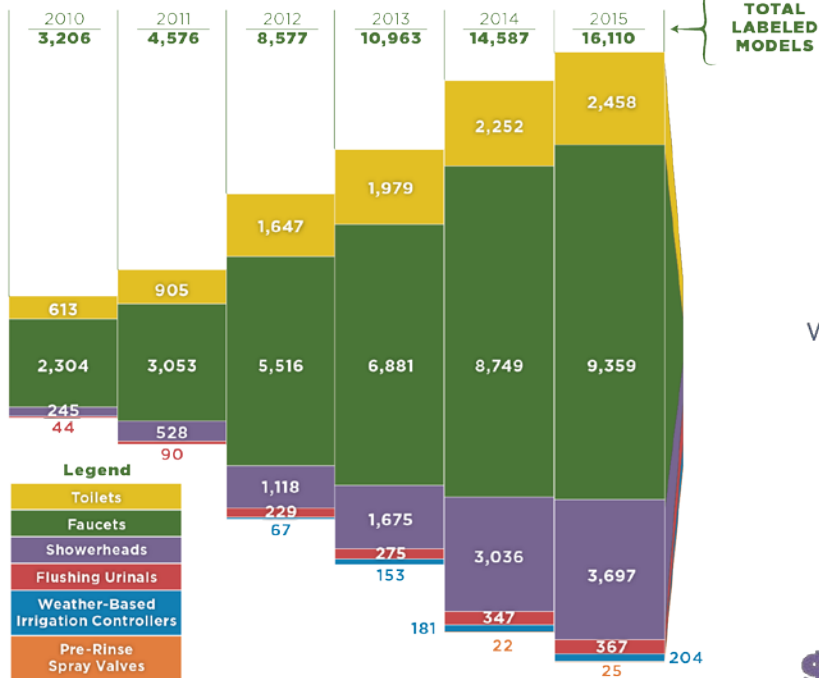


Accomplishments

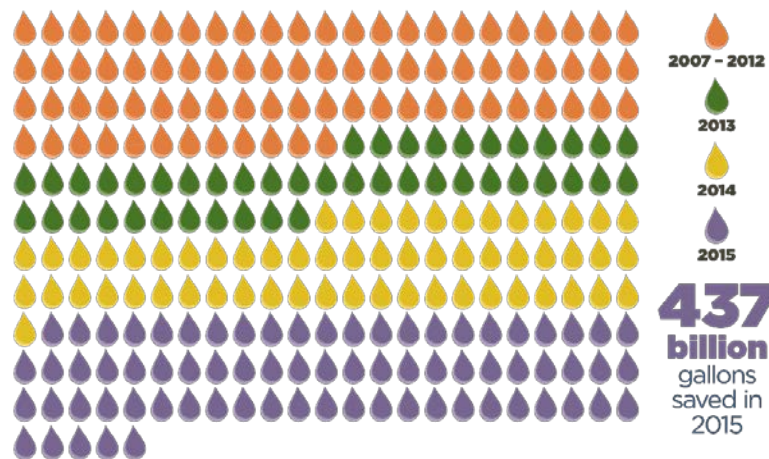
WaterSense Labeled Products



Ever since the first WaterSense labeled toilets hit store shelves in 2007, more and more product types have earned the WaterSense label, and the total number of WaterSense labeled models continues to grow.



1.5 trillion gallons of water saved since 2006!



That's **more than** the amount of water used by all of the households in **California for a year!**

WaterSense partners helped...



...consumers save **\$32.6 billion** in water and energy bills

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Specification Development for Spray Sprinkler Bodies



Notice of Intent

- Released NOI for Landscape Irrigation Sprinklers in July 2014
- Proposed specification development for both high-efficiency nozzles and pressure-regulating sprinkler bodies
- Based on public comment and lack of savings data for nozzles, WaterSense moved forward with specification development for sprinkler bodies with integral pressure regulation



Spray Sprinkler Bodies with Integral Pressure Regulation



- Most sprinklers on the market have operating pressures between 15 and 70 psi with a recommended pressure of between 30 and 45 psi
- Many irrigation systems operate at pressures higher than recommended
- Higher operating pressure can result in system inefficiencies
 - Excessive flow rates
 - Misting
 - Fogging
 - Uneven coverage



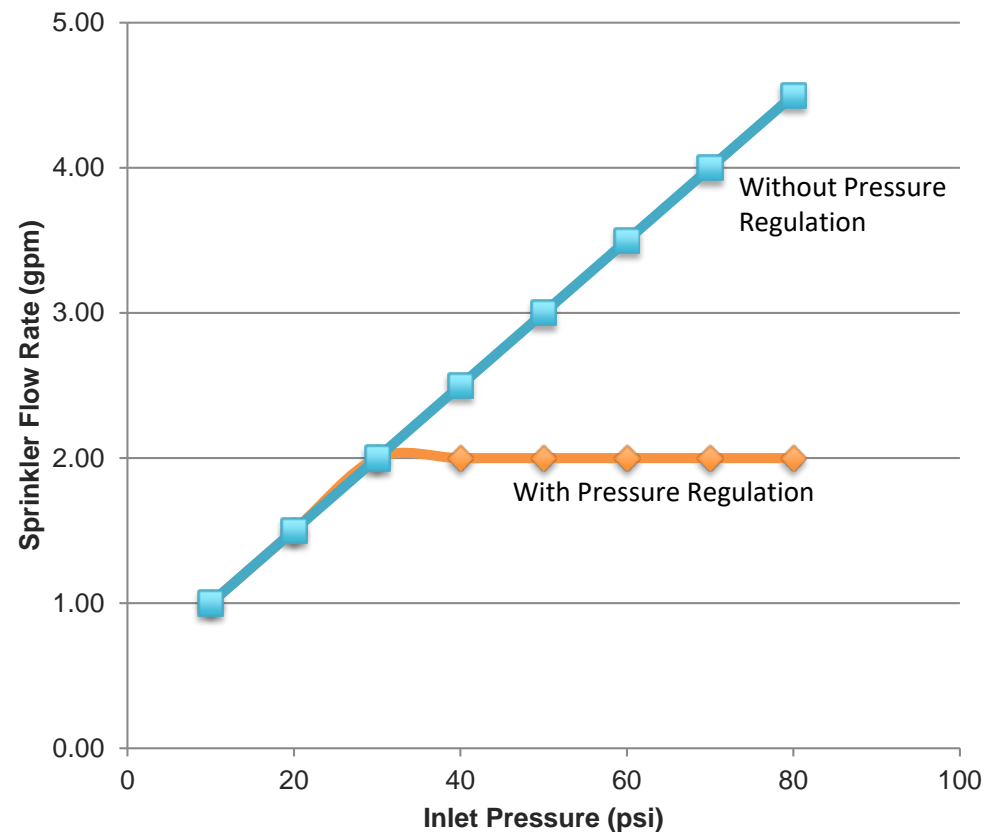
Photo: Brent Mecham, IA

Spray Sprinkler Bodies with Integral Pressure Regulation

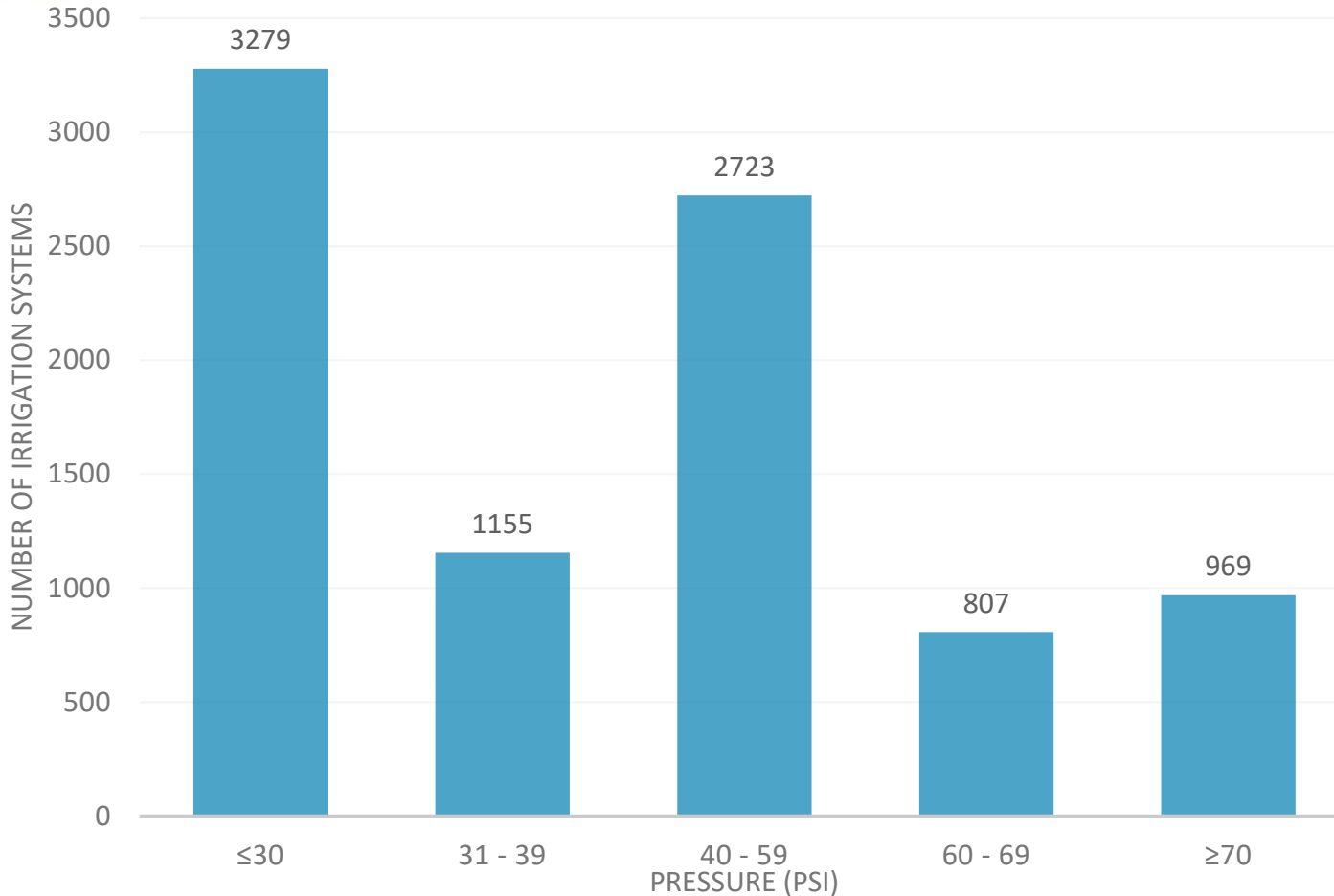


- Sprinklers with integral pressure regulation maintain constant outlet pressure and flow across a range of inlet pressures
- This reduces excessive flows and waste that would otherwise occur at high pressures
- The nozzle is also able to generate appropriate water droplet size and provide for more uniform distribution of water across the landscape

Example of the Effect of Pressure Regulation on Flow Rate



Opportunity for Water Savings



Irrigation System Pressure Data, Utah State University and Center for Resource Conservation

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Test Method Development and Performance Testing



Test Method Development

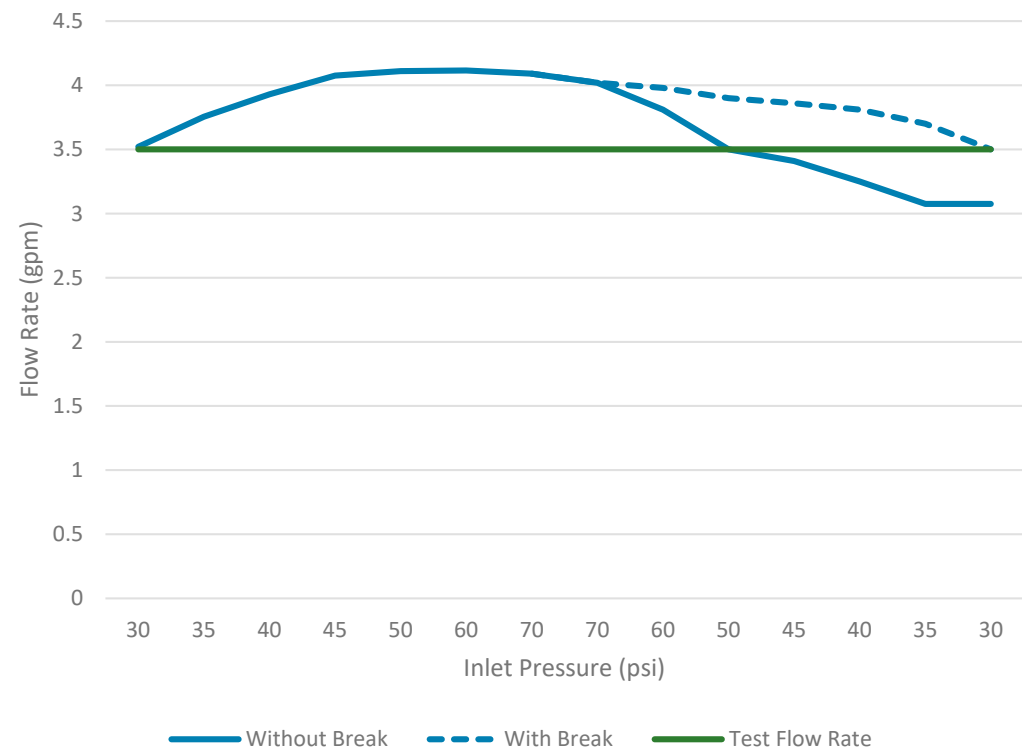
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Conducted performance testing with three independent labs in 2015 to validate a draft test method primarily based on *ASABE/ICC 802-2014*.

Modifications include:

- Added high flow rate (3.5 gpm) in addition to 1.5 gpm flow rate
- Measured flow in addition to outlet pressure
- Reduced pressure levels from 12 to 5
- Allowed a variety of methods to control flow (e.g., needle valve, variable arc nozzle)
- Introduced a reduction to 0 psi between test levels to address hysteresis.



Test Method Development

- Fall 2015 to April 2016—Each laboratory tested three models of three separate brands of spray sprinkler bodies with integral pressure regulation as well as three models of standard spray sprinkler bodies of the same brands
- Results demonstrated that the spray sprinkler bodies with integral pressure regulation were able to effectively regulate pressure and flow rate
- However, the results were inconsistent among laboratories, indicating the test method needed to be calibrated and clarified
- WaterSense subsequently revised the test method to specify that a needle valve should be used to control flow

Performance Testing

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- Fall 2016—Conducted final performance testing at the University of Florida
 - Eight models with integral pressure regulation and three standard spray models using the revised test method
- Purpose
 - Further validate and refine the test protocol
 - Determine the range of product performance
 - Evaluate potential savings of spray sprinkler bodies with integral pressure regulation when compared to their standard counterparts
- Data form basis for the efficiency and performance criteria included in the draft specification and the water savings estimates described in the supporting statement

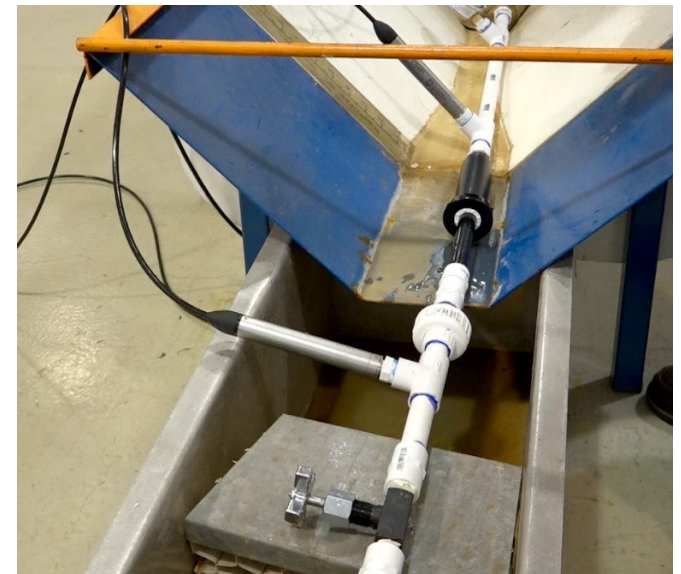


Test Process

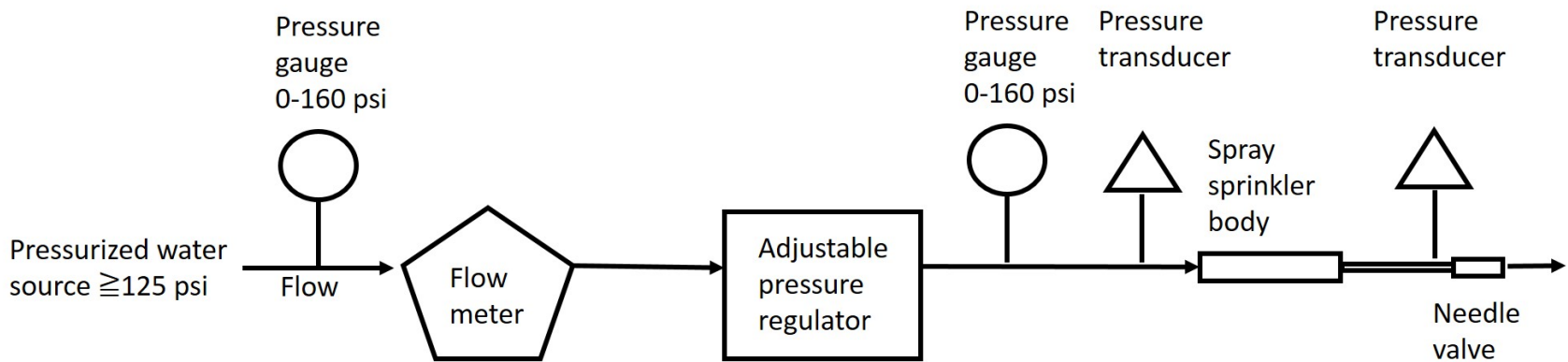
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- Verify flow rate at regulation pressure (three consecutive readings)
- Reduce pressure to zero (for at least 1 min)
- Increase pressure to regulation pressure +10 psi (3-5 min test, 30 sec recording)
- Reduce pressure to zero
- Increase pressure to 60 psi
- Reduce pressure to zero
- Increase pressure to 70 psi
- Repeat for 60 psi, regulation pressure +10 psi



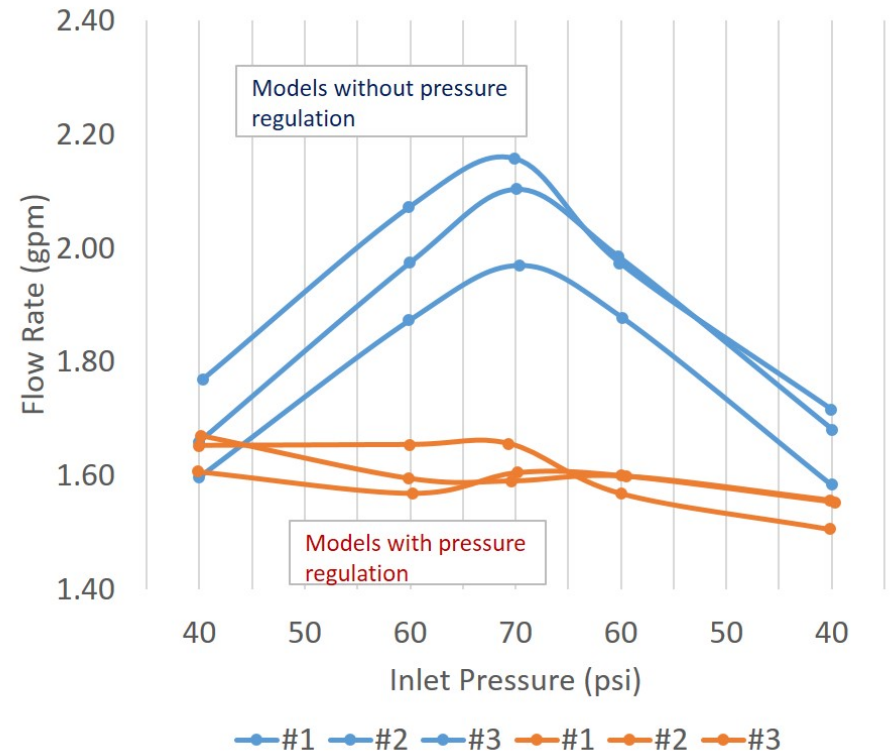
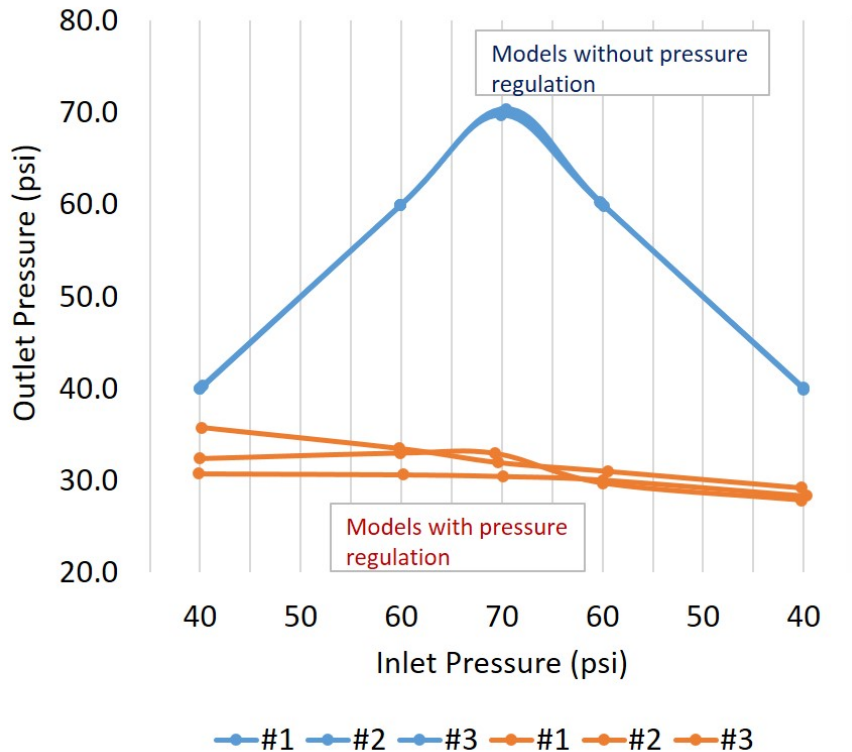
Test Setup



Length of pipe upstream and downstream of flowmeter according to manufacturer specification

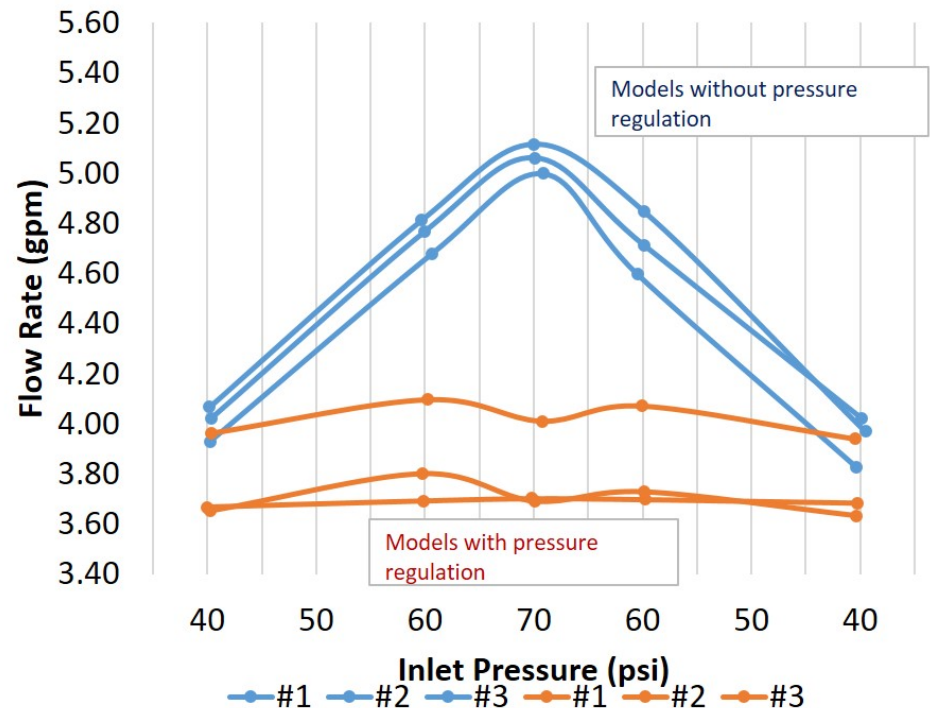
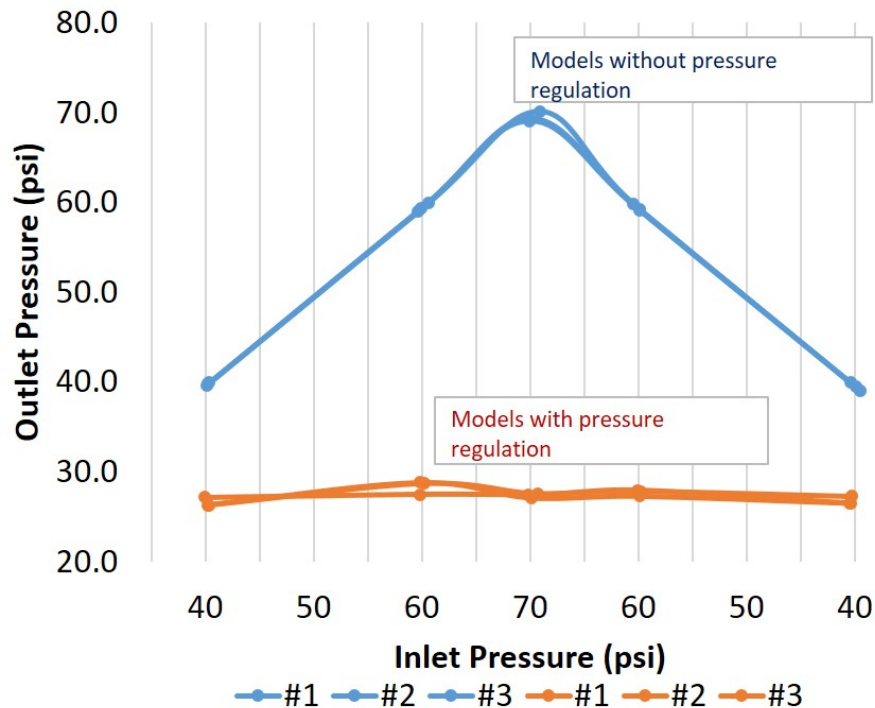
Results

Brand A: Spray sprinkler body with integral pressure regulation vs. standard spray body
 Tested at 1.5 gpm



Results

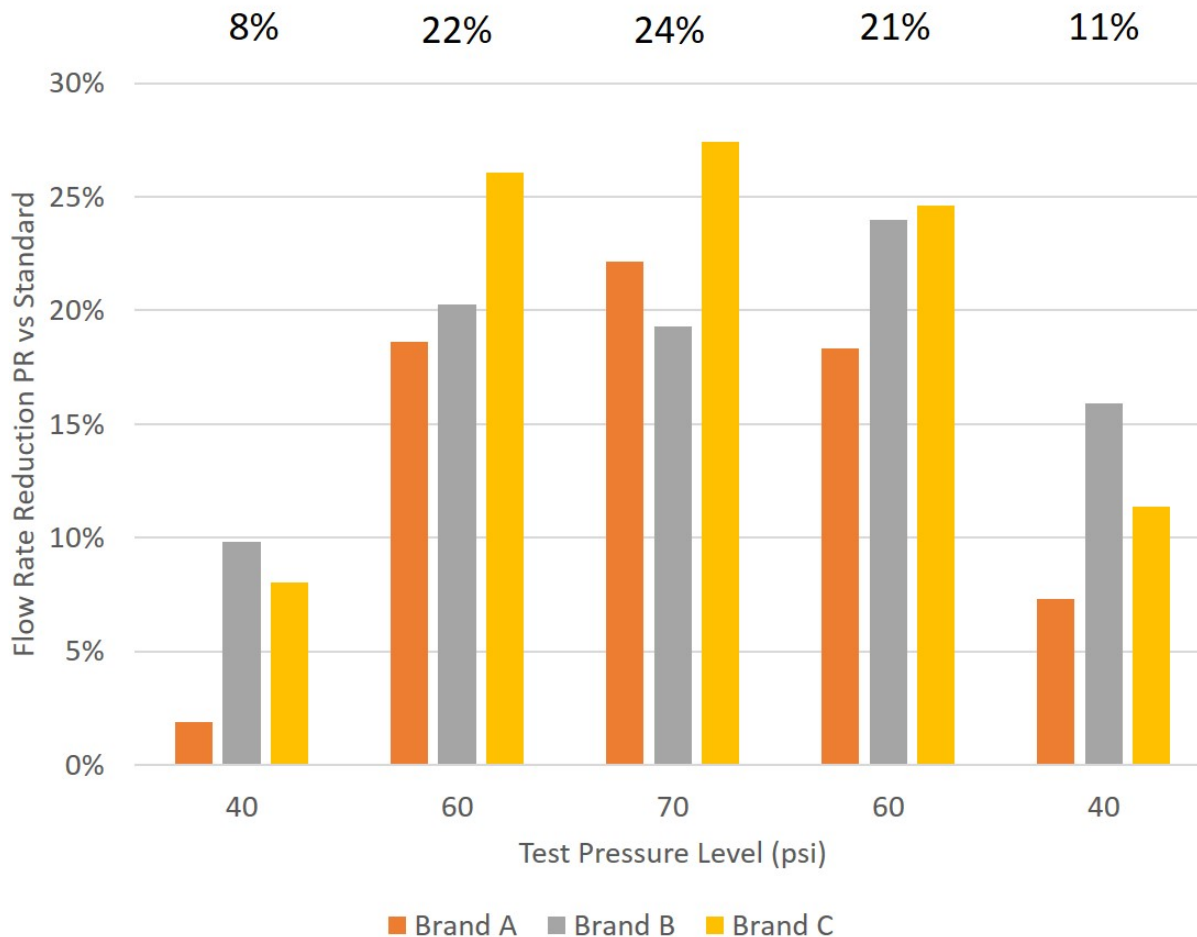
Brand A: Spray sprinkler body with integral pressure regulation vs. standard spray body
 Tested at 3.5 gpm



Results



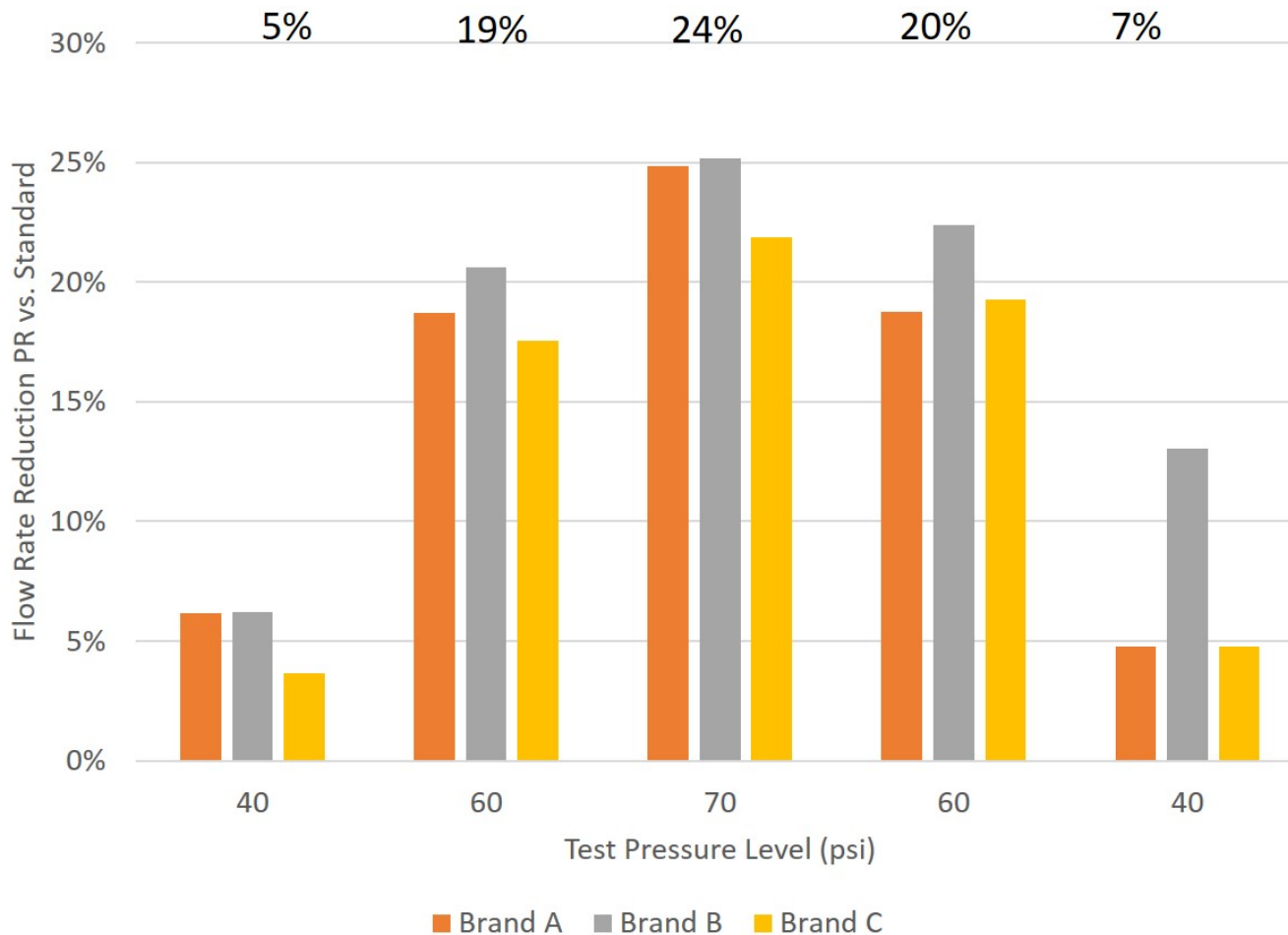
Flow Rate Reduction = Potential Water Savings
Comparison of Spray Sprinkler Body with Integral Pressure Regulation vs.
Standard Spray Sprinkler Body at 1.5 gpm



Results



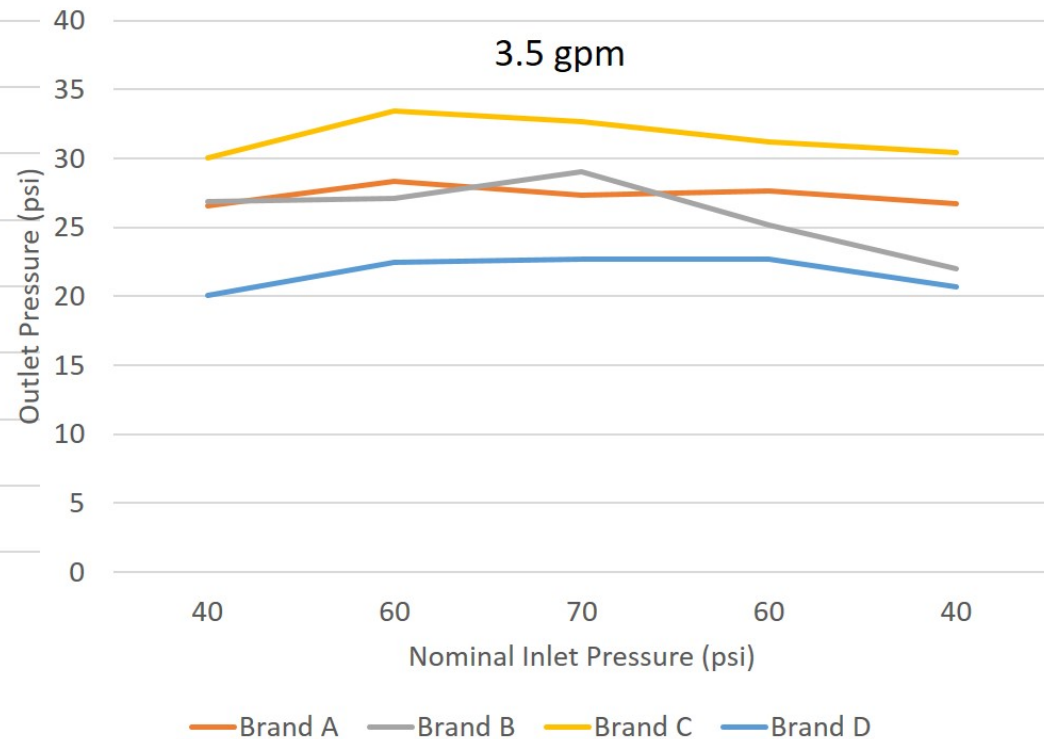
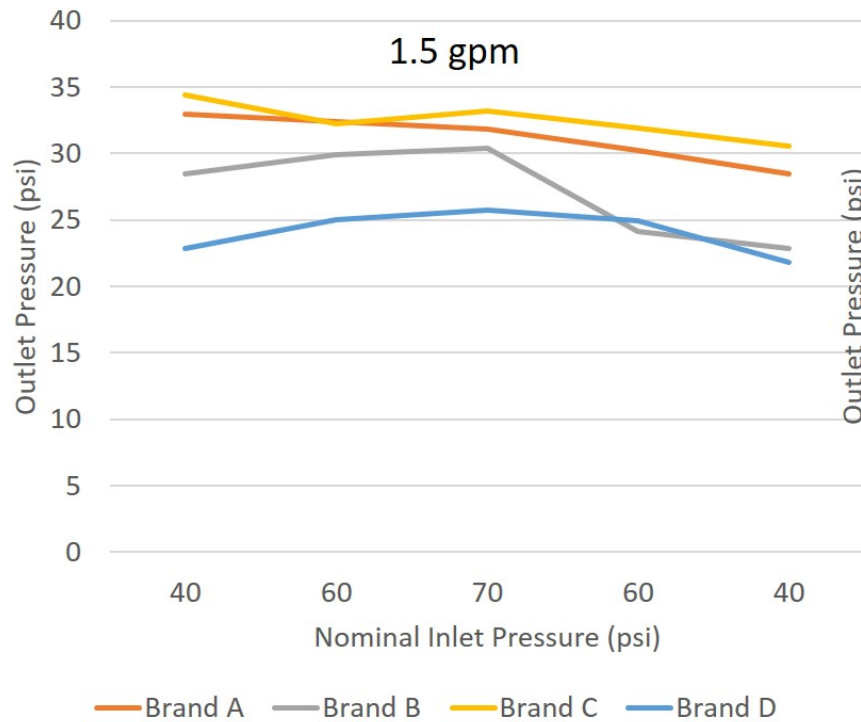
Flow Rate Reduction = Potential Water Savings
Comparison of Spray Sprinkler Body with Integral Pressure Regulation vs.
Standard Spray Sprinkler Body at 3.5 gpm



Results



Outlet Pressure for Spray Sprinkler Bodies with Integral Pressure Regulation

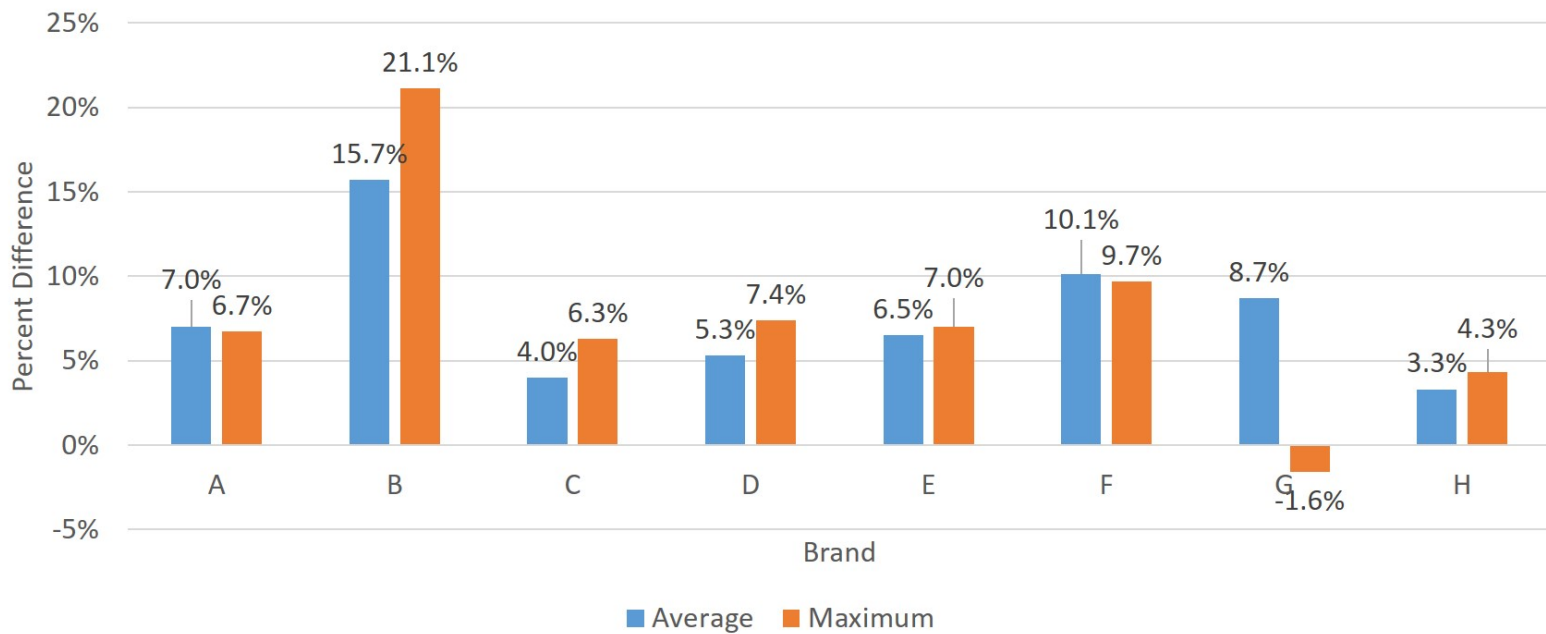


Changes to Test Method

- Based on the results, the following changes were made to the test method, resulting in the version included in the draft specification
 - Eliminated test levels in the falling limb of the pressure test level curve. Final pressure test levels include calibration point (i.e., regulation pressure), 10 psi above the regulation pressure, 60 psi, and 70 psi or the maximum operating pressure, whichever is greater
 - The falling limb data was very similar to the rising limb
 - Sprinklers are not operated up and down a curve in the field
 - Test at only one flow rate (1.5 gpm)
 - Results between 1.5 gpm tests and 3.5 gpm tests were similar
 - 1.5 gpm is specified in ASABE/ICC 802-2014 and is more commonly found in the field than 3.5 gpm

Summary Results

Percent Difference Between Flow Rate at Tested Pressure Level(s) and the Flow Rate at the Calibration Point (1.5 gpm, rising limb only)





Questions?

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