Pre-Rinse Spray Valves
Program Guide

For more information, contact:
Kim Erickson
Program Manager
Commercial Kitchens Committee
kerickson@cee1.org
617-532-0026
Consortium for Energy Efficiency
98 North Washington Street, Suite 101
Boston, MA  02114

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1 Background
This document is part of the CEE™ Commercial Kitchens Initiative (Initiative), which was launched in 2005 to provide clear and credible definitions in the marketplace as to what constitutes highly efficient energy and water performance in commercial cooking, refrigeration, and sanitation equipment and to help streamline the selection of products through a targeted market strategy. Since 2005, CEE has developed a suite of specifications to identify energy and water efficient commercial kitchen equipment, tracked availability of commercial kitchen efficiency programs, and documented the approaches and impacts of existing programs. CEE members can find more information on the current Initiative direction and activities on the CEE Forum. Additional resources and specifications have been developed by the ENERGY STAR® program, including specifications and guidance for operators and efficiency program administrators.

2 Purpose
The purpose of this document is to provide guidance to CEE member energy efficiency program administrators information to streamline the development and maintenance of voluntary energy efficiency programs for pre-rinse spray valves. This document is part of the CEE Commercial Kitchens Initiative and intended to support the CEE Pre-Rinse Spray Valves specification. It includes consensus based guidance to CEE member energy efficiency program administrators on topics relevant to program design and development on the following topics: equipment description, product use and lifetimes, specifications and test methods, product availability, price differential, energy savings, program design tips, and references to additional resources. This document was created by CEE staff based on research and analysis conducted by the CEE Commercial Kitchens Committee during development of the CEE Pre-Rinse Spray Valves specification. It does not provide program design recommendations or CEE policy positions.

3 Equipment Description
Pre-rinse spray valves are handheld devices designed and marketed for use with commercial dishwashing and warewashing equipment and applications that spray water on dishes, flatware, and other food service items for the purpose of removing food residue before cleaning the items.¹

¹ EPA WaterSense™ Pre-Rinse Spray Valve specification (http://www.epa.gov/watersense/partners/prsv_final.html).
Products that are used for pot and kettle filling, pet grooming, grocery produce and meat cleaning, residential dish rinsing, and other purposes beyond that described above are outside the scope of this guide.

Efficiency is not a driving factor in most customers PRSV purchasing decisions; most customers will simply purchase whatever unit their local supplier recommends and has in stock.

4 Product Use and Lifetimes
According to the Food Service Technology Center’s (FSTC) Life Cycle Cost Calculator\(^2\) for pre-rinse spray valves and the research EPA conducted as part of the WaterSense specification development process,\(^3\) customers use PRSVs between 1 and 3 hours per day, 344-365 days per year, over the product’s life of 2-5 years.

<table>
<thead>
<tr>
<th></th>
<th>FSTC</th>
<th>WaterSense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Use Time</td>
<td>3 hours</td>
<td>64 minutes</td>
</tr>
<tr>
<td>Days Used per Year</td>
<td>365 days</td>
<td>344 days</td>
</tr>
<tr>
<td>Life Time</td>
<td>2 years</td>
<td>5 years</td>
</tr>
</tbody>
</table>

The estimated energy savings calculations in this guide are based on the FSTC assumptions because most CEE members rely on the FSTC calculators to calculate savings for other foodservice equipment categories.

5 Specifications and Test Methods
The CEE PRSV Specification includes three performance metrics:

1. Flow rate, tested in accordance with ASTM F2324, *Standard Test Method for Pre-Rinse Spray Valves*

2. Spray force, tested in accordance with ASTM F2324, *Standard Test Method for Pre-Rinse Spray Valves*

3. Life cycles, tested in accordance with *ASME A112.18.1/CSA B125.1 Plumbing Supply Fittings*


Each metric is described in detail below. Cleanability criteria, measured in accordance with ASTM F2324, *Standard Test Method for Pre-Rinse Spray Valves*, are not included in the CEE specification for reasons described below. Included in the discussion below are insights from a PRSV field study the US Environmental Protection Agency (EPA) conducted from January to June 2010. In this field study, EPA monitored PRSV use at 10 commercial and institutional kitchens for three weeks. The PRSVs in the study had flow rates from 0.5 to 1.6 gpm and cleanability times from 17 to 26 seconds per plate. EPA surveyed users about their satisfaction with the PRSVs at the end of the study.

**Flow Rate**

Flow rate, tested in accordance with ASTM F2324, is measured in gallons per minute. To measure flow rate, testers aim the PRSV at a receptacle and then measure the amount of water that flowed through the PRSV into the receptacle in a given amount of time. In the study described above, EPA confirmed that flow rate is a good indicator of energy and water savings. In the study, users did not operate lower flow PRSVs significantly longer than higher flow models. Higher flow rates did correlate somewhat to higher user satisfaction. However, the CEE specification does not require a minimum flow rate to ensure user satisfaction because a minimum flow rate might limit innovation to create effective lower flow designs. To address user satisfaction concerns, the CEE specification requires a minimum spray force.

**Spray Force**

Spray force, tested in accordance with ASTM 2324, is a measure of the impact from a PRSV on the target surface. Testers measure spray force by aiming the PRSV directly at a force gauge and recording the force measurement in ounces-force (ozf). This metric was developed in response to concerns that lower flow valves may result in lower user satisfaction. The CEE Specification requires a minimum of 4 ounces-force at both the Tier 1 and Tier 2 levels. This represents a minimum baseline of performance to mitigate potential negative user experiences. For information about how this metric was developed, please see EPA’s *WaterSense Specification for Commercial Pre-Rinse Spray Valves Supporting Statement*. To determine spray force’s efficacy as a performance metric, EPA mapped laboratory force test data to user satisfaction data for the 14 PRSV models monitored in the field study described above. While the correlation between spray force and user satisfaction was not excellent, spray force does correlate better to user satisfaction than cleanability (discussed below).

**Life Cycles**

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4 [http://www.epa.gov/watersense/partners/prsv_final.html](http://www.epa.gov/watersense/partners/prsv_final.html)
Manufacturers life cycle test PRSVs to ASME A112.18.1/CSA B125.1 Plumbing Supply Fittings. Units that are certified to meet the ASME standard must perform a minimum of 150,000 cycles. During the field study described above, about half of certified and half of uncertified models leaked or otherwise malfunctioned during the three week testing period. For this reason, the CEE Specification requires a more rigorous life 250,000 cycles, which is the same number of cycles required in the WaterSense PRSV specification and more strongly correlates to the expected life of PRSVs.

**Cleanability**

Cleanability was originally intended as a metric to provide a performance floor, but early program experience indicated that PRSVs scoring well on cleanability would not necessarily live up to customer expectations. In the field study described above, EPA confirmed the poor relationship between cleanability and user performance satisfaction. EPA also found that ASTM F2324-03 cleanability test results did not correlate with actual use time in the field. Given the field test results, the CEE Specification does not include cleanability requirements.

### 6 Product Availability and Market Penetration

Between 300,000 and 750,000 PRSVs are sold in the US each year.\(^5\) As of the writing of this document sixteen PRSV manufacturers or entities that brand these products have been identified (as listed in AutoQuotes or the US Department of Energy (DOE) Compliance Certification Database):

- Allpoints
- BKResource
- Bricor
- Centaur
- Chicaco Faucet
- Component Hardware
- Dormont

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\(^5\) The National Restaurant Association (NRA) estimates that there are approximately 990,000 commercial foodservice establishments in the US (http://www.restaurant.org/News-Research/Research/Facts-at-a-Glance). EPA, based on observations during its field study and input from stakeholders, assumes that there are 1.5 PRSVs per foodservice establishment on average, resulting in approximately 1.5 million PRSVs in use in the US (http://www.epa.gov/watersense/docs/prsv_finalspec_suppstate_09.19.13_final_508.pdf). The FSTC estimates a 2 year useful life for PRSVs (based on a previous version of its life cycle cost calculator) and EPA, in the report cited above, estimates a 5 year useful life. So, between 20% and 50% of an estimated 1.5 million units are replaced per year—in other words, between 300,000 and 750,000 are replaced per year, assuming no growth in the number of foodservice facilities.
• Eagle Group
• Encore
• Fisher
• Krowne
• Meisheng
• Strahman
• Trident
• T&S Brass
• Zurn

Each manufacturer may make a small number of models that vary by quality of construction, flow rate, and spray pattern. Manufacturers also package PRSVs in multiple ways: as stand-alone products, as parts of plumbing assemblies that may include faucets, hoses, or other plumbing components, or broken down into PRSVs components (for example, just the head, without the valve).

Multiple models and manufacturers meet the flow rate criteria for both Tiers of the CEE PRSV Specification (see table and figure below). Of these, we do not know how many would or would not meet the spray force or life cycle criteria because most manufacturers have not yet completed testing to these criteria. Manufacturers are currently in the process of testing their PRSVs and we expect that the results will be made available when they seek WaterSense certification.

**Qualifying models based on flow rate criteria only.**

<table>
<thead>
<tr>
<th></th>
<th>Tier 1</th>
<th>Tier 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Models in Data Set</strong></td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td><strong># of Qualifying Models</strong></td>
<td>37</td>
<td>11</td>
</tr>
<tr>
<td><strong>% Qualifying Models</strong></td>
<td>74%</td>
<td>22%</td>
</tr>
<tr>
<td><strong># Total Manufacturers</strong></td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td><strong># of Manufacturers with 1+ Qualifying Products</strong></td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td><strong>% Manufacturers with 1+ Qualifying Products</strong></td>
<td>92%</td>
<td>38%</td>
</tr>
</tbody>
</table>
Pre-Rinse Spray Valve Flow Rate Performance

- Meets Federal Standard
- Tier 1/WaterSense Qualifying
- Tier 2 Qualifying
- Federal Min. Std.
- Tier 1/WaterSense Min. Req.
- Tier 2 Min. Req.
7 Incremental Retail Price

Based on the prices of popular PRSVs available via online dealers, there is not a price differential between standard and high efficiency pre-rinse spray valves. Some manufacturers offer what is essentially the same valve in both standard and high efficiency versions. The primary difference between standard and high efficiency versions is the spray nozzle—the rest of the plumbing components in these cases are the same in both the standard and high efficiency versions.

The table below shows the online prices for standard and high efficiency PRSVs made by T&S Brass. The unit construction, except for the nozzle, is essentially the same, as are the prices.

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Model number</th>
<th>Flow Rate (gpm)</th>
<th>Tier 1/ WaterSense Qualifying*</th>
<th>Tier 2 Qualifying*</th>
<th>Online Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>T&amp;S</td>
<td>B-0107-C</td>
<td>0.64</td>
<td>yes</td>
<td>yes</td>
<td>$50</td>
</tr>
<tr>
<td>T&amp;S</td>
<td>B-0107</td>
<td>1.4</td>
<td>no</td>
<td>no</td>
<td>$50</td>
</tr>
<tr>
<td>T&amp;S</td>
<td>B-0108-C</td>
<td>0.64</td>
<td>yes</td>
<td>yes</td>
<td>$74</td>
</tr>
<tr>
<td>T&amp;S</td>
<td>B-0108</td>
<td>1.48</td>
<td>no</td>
<td>no</td>
<td>$74</td>
</tr>
</tbody>
</table>

*Based on flow rate only.

8 Energy and Water Savings

The following energy and water savings estimates were developed using the FSTC savings calculator for pre-rinse spray valves.7

<table>
<thead>
<tr>
<th>Criteria</th>
<th>US Federal Minimum Standard</th>
<th>Tier 1 Qualifying</th>
<th>Tier 2 Qualifying</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device flow rate (gallons per minute, gpm)</td>
<td>1.6</td>
<td>1.28</td>
<td>0.75</td>
</tr>
<tr>
<td>Operating hours per day</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Operating days per year</td>
<td>365</td>
<td>365</td>
<td>365</td>
</tr>
<tr>
<td>Annual water consumption (gallons)</td>
<td>105,120</td>
<td>84,096</td>
<td>49,275</td>
</tr>
<tr>
<td>Annual water savings (gallons)</td>
<td>n/a</td>
<td>21,024</td>
<td>34,821 (Tier 1 to Tier 2)</td>
</tr>
<tr>
<td>Annual water savings (%)</td>
<td>n/a</td>
<td>20%</td>
<td>40% (Tier 1 to Tier 2)</td>
</tr>
<tr>
<td>Annual water heating energy with electric water heater (95% efficient, 70 degree rise) (kWh)</td>
<td>18,905</td>
<td>15,124</td>
<td>8,862</td>
</tr>
</tbody>
</table>

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6 Prices are from www.foodservicewarehouse.com as of October 11, 2013.

7 http://www.fishnick.com/savewater/tools/watercalculator/
### 9 Program Design Tips

CEE members promoting high efficiency PRSVs have primarily taken either or both of the following approaches to date:

- Prescriptive incentives
- Direct installation

Many CEE members have leveraged PRSV direct installation programs to get a foot in the door with customers and build a relationship that eventually leads to additional high efficiency equipment purchases. Others will, with permission, leave magnets or stickers on other equipment intended to remind customers to seek out high efficiency equipment and program incentives upon failure and replacement of that equipment.

### 10 Additional Resources

Additional resources that may be useful are:

- WaterSense Pre-Rinse Spray Valves page 
  <http://www.epa.gov/watersense/partners/prsv_final.html>. Includes a specification, qualified product list (pending development as of February 2014), and general information about pre-rinse spray valves.
- Pacific Gas and Electric Food Service Technology Center (FSTC) Life Cycle Cost Calculators 
  <http://www.fishnick.com/saveenergy/tools/calculators/>. On this web page, the FSTC provides a life cycle cost calculator for pre-rinse spray valves. Calculators for other commercial kitchen equipment categories are also provided.