WaterSense at Work

Commercial Kitchen Equipment

4.1 Pre-Rinse Spray Valves

Best Management Practices for Commercial and Institutional Facilities

EPA WaterSense

May 2023

WaterSense® is a voluntary partnership program sponsored by the U.S. Environmental Protection Agency (EPA) that seeks to protect the nation's water supply by transforming the market for water-efficient products, services, and practices.

WaterSense at Work is a compilation of water efficiency best management practices intended to help commercial and institutional facility owners and managers from multiple sectors understand and better manage their water use. It provides guidance to help establish an effective facility water management program and identify projects and practices that can reduce facility water use.

An overview of the sections in *WaterSense at Work* is below. This document, covering water efficiency for pre-rinse spray valves, is part of **Section 4: Commercial Kitchen Equipment**. The complete list of best management practices is available at www.epa.gov/watersense/best-management-practices. WaterSense has also developed worksheets to assist with water management planning and case studies that highlight successful water efficiency efforts of building owners and facility managers throughout the country, available at www.epa.gov/watersense/commercial-buildings.

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This document is one section from *WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities* (EPA-832-F-23-003). Other sections can be downloaded from www.epa.gov/watersense/best-management-practices. Sections will be reviewed and periodically updated to reflect new information. The work was supported under contract 68HERC20D0026 with Eastern Research Group, Inc. (ERG).

Overview

Commercial pre-rinse spray valves are spray nozzles that use water under pressure to remove food residue from plates, pots, pans, and other kitchen utensils prior to sanitation in a dishwasher. Pre-rinse spray valves designed for commercial dishwashing are different from spray valves used for filling glasses, pots, or kettles and for washing down countertops, floors, and other kitchen areas. These other types of spray valves typically have very different usage patterns and higher flow rates, and they are not the focus of this document.

Pre-rinse spray valves designed for commercial dishwashing are connected to a hose, which is connected to the water supply. These handheld devices consist of a spray nozzle, a squeeze lever that controls the water flow, and a dish guard bumper. They often include a spray handle clip, allowing the user to lock the lever at full spray for continual use, which can reduce hand strain. They can be installed at the end of a flexible stainless steel hose and can include a foot-operated, on-off lever. Pre-rinse spray valves are usually located at the entrance to a dishwasher or over a sink and are used in conjunction with a faucet fixture.

Pre-rinse spray valves can account for nearly one-third of the water used in a typical commercial kitchen. Replacing an old, inefficient pre-rinse spray valve is one of the most cost-effective projects a commercial kitchen can implement to achieve water and energy savings.

The U.S Environmental Protection Agency's (EPA's) WaterSense® program published a specification for commercial pre-rinse spray valves in 2013 with a maximum flow rate of 1.28 gallons per minute (gpm) (4.8 liters per minute [lpm]).[1] At the time, the specification represented a 20 percent flow rate reduction from the federally allowable maximum flow

[1] U.S. Environmental Protection Agency's (EPA's) WaterSense program. Pre-Rinse Spray Valves. www.epa.gov/watersense/pre-rinse-spray-valves.

rate of 1.6 gpm (6.1 lpm) established by the Energy Policy Act (EPAct) of 2005. Older models manufactured prior to EPAct 2005 can use between 3.0 and 4.5 gpm (11.4 and 17.0 lpm).

In 2018, the U.S. Department of Energy (DOE) revised the federal energy conservation standard for commercial pre-rinse spray valves. The new regulation, which was built on the WaterSense specification flow rate and test method for performance, went into effect in 2019 and requires all commercial pre-rinse spray valves sold in the United States to meet the efficiency criteria included in Table 1 below, based on the product's achievable spray force.

Table 1. Water Consumption Requirements for DOE-Compliant Commercial Pre-Rinse Spray Valves

Product Class by Spray Force	Maximum Flow Rate (gpm)	Maximum Flow Rate (lpm)
Product Class 1 ≤ 5.0 ounces-force [ozf] (≤ 142 grams-force [gramf])	1.00	3.79
Product Class 2 > 5.0 ozf and ≤ 8.0 ozf (> 142 gramf and ≤ 227 gramf)	1.20	4.54
Product Class 3 > 8.0 ozf (> 227 gramf)	1.28	4.85

When the new DOE regulation went into effect in 2019, EPA sunset its specification, and pre-rinse spray valves can no longer earn the WaterSense label, since all models must be within the maximum flow rate.

Replacing a pre-rinse spray valve that flows at 1.6 gpm (6.1 lpm) or higher with a DOE-compliant model will result in significant water and energy savings and a simple payback period of less than one year for most facilities.

Operation, Maintenance, and User Education

For optimal pre-rinse spray valve efficiency, system pressure should be tested regularly and should be between 20 and 80 pounds per square inch (psi) (138 and 552 kiloPascals [kPa]). This will ensure that the pre-rinse spray valve will deliver the expected flow and performance. In addition, consider the following:

- Ensure that the pre-rinse spray valve unit's hose height is appropriate for the user (i.e., neither too high nor too low). If the pre-rinse spray valve is not situated at an optimal height, users could choose to use other methods with higher flow rates.
- To decrease water use, train users to manually scrape as much food waste from dishes as possible before using the pre-rinse spray valve.
- Train users how to properly use the always-on clamp, if available. Improper use of the always-on clamp could lead to unnecessary water waste. If a constant stream of water is not necessary, train users to manually depress the pre-rinse spray valve handle only when water is needed.

Scrape Dishes to Save

Scraping dishes prior to rinsing them with pre-rinse spray valves can reduce a facility's water use and reduce the load on the facility's garbage disposal. In cafeteria style establishments, post signage to prompt users to scrape their own dishes at the end of a meal. Alternatively, train dishwashing staff to scrape dishes before using the pre-rinse spray valve to remove additional food waste.

- Periodically inspect pre-rinse spray valves for scale buildup to ensure flow is not being restricted. There are certain cleaning products designed to dissolve scale buildup on pre-rinse spray valves. Do not attempt to bore holes in the pre-rinse spray valve, as this may lead to increased water use or cause performance problems. If scale cannot be removed, consider replacing the pre-rinse spray valve with a new model.
- Periodically inspect pre-rinse spray valves for leaks and broken or loose parts, and train users and other kitchen staff to identify and report leaks. If necessary and possible, tighten screws and fittings to stop leakage. If the product cannot be manually adjusted to perform properly, consider replacing the pre-rinse spray valve.

Retrofit Options

Because pre-rinse spray valves are relatively inexpensive, consider replacement rather than a retrofit or extensive repair. In general, avoid retrofitting existing, inefficient pre-rinse spray valves with flow control inserts (which restrict water flow) to reduce the flow rate. These devices might not provide adequate performance for rinsing, thereby increasing use time and total water used.

Replacement Options

When installing new pre-rinse spray valves or replacing older, inefficient pre-rinse spray valves, choose DOE-compliant models with flow rates of 1.28 gpm (4.85 lpm) or less.

When selecting a replacement pre-rinse spray valve, select a model that has a spray force suitable for its end use. For restaurants and commercial kitchens with only light dishwashing needs, a model with a lower measured spray force is likely adequate. Models with lower spray forces tend to use less water than models with higher spray force. Alternatively, facilities that consistently encounter dishes and cookware with baked-on and caked-on food could benefit from a pre-rinse spray valve with a higher spray force.

Savings Potential

Because water use of pre-rinse spray valves is dependent on facility operations and factors such as average throughput, water savings will vary by facility. To estimate facility-specific water savings and payback, use the following information.

Current Water Use

To estimate the current water use of a pre-rinse spray valve, identify the following information and use Equation 1 on the next page:

- Flow rate of the existing pre-rinse spray valve: Pre-rinse spray valves installed between 2005 and 2019 have flow rates of 1.6 gpm (6.1 lpm) or less. Pre-rinse spray valves installed before 2005 can have flow rates of up to 4.5 gpm (17.0 lpm).
- Average daily use time: This will vary by facility, but facilities typically use pre-rinse spray valves for no more than 200 minutes per day.[2]
- Days of facility operation per year.

[2] EPA's WaterSense program. March 31, 2011. *Pre-Rinse Spray Valves Field Study Report*. Page 22. www.epa.gov/sites/default/files/2017-02/documents/ws-background-prsv-field-study-report.pdf.

Equation 1. Water Use of Pre-Rinse Spray Valve (gallons or liters per year)

= Pre-Rinse Spray Valve Flow Rate x Daily Use Time x Days of Facility Operation

Where:

- Pre-Rinse Spray Valve Flow Rate: Gallons or liters per minute
- Daily Use Time: Minutes per day
- Days of Facility Operation: Days per year

Water Use After Replacement

To estimate the water use of a more efficient replacement pre-rinse spray valve, use Equation 1, substituting the flow rate of the replacement pre-rinse spray valve. New, DOE-compliant pre-rinse spray valves use 1.28 gpm (4.85 lpm) or less.

Water Savings

To calculate the water savings that can be achieved from replacing an existing pre-rinse spray valve, identify the following information and use Equation 2 below:

- Current water use as calculated using Equation 1.
- Water use after replacement as calculated using Equation 1.

Equation 2. Water Savings From Pre-Rinse Spray Valve Replacement (gallons or liters per year)

= Current Water Use of Pre-Rinse Spray Valve – Water Use of Pre-Rinse Spray Valve After Replacement

Where:

- Current Water Use of Pre-Rinse Spray Valve: Gallons or liters per year
- Water Use of Pre-Rinse Spray Valve After Replacement: Gallons or liters per year

Energy Savings

Because pre-rinse spray valves use hot water, a reduction in water use will also result in energy savings. The energy required to heat water can be dependent on the fuel used for water heating (e.g., electricity, natural gas), the efficiency of the water heater, and water heater temperature set points. Since this information is not always readily available, energy savings that can be achieved from replacing an existing pre-rinse spray valve can be estimated using the water savings calculated using Equation 2 and the assumptions presented in Equation 3 on the next page.

Equation 3. Energy Savings From Pre-Rinse Spray Valve Replacement (kWh of electricity or Mcf of natural gas per year)

= Water Savings x Average Percent of Water That is Hot x (Energy per Gallon Heated ÷ Water Heater Efficiency)

Where:

- Water Savings: gallons (or liters) per year
- Average Percent of Water That Is Hot: 100%
- Energy per Gallon or Liter Heated (assuming 75°F water temperature increase):
  - 0.183 kilowatt hours (kWh) of electricity per gallon (0.048 kWh per liter); or
  - 0.0006 thousand cubic feet (Mcf) of natural gas per gallon (0.00016 Mcf per liter)
- Water Heater Efficiency (unless otherwise known by the facility):
  - 1.00 for an electric hot water heater; or
  - 0.75 for a natural gas hot water heater

More detailed information to assist in calculating energy savings that result from saving water can be found on WaterSense's data and information web page at www.epa.gov/watersense/data-and-information-used-watersense.

Payback

To calculate the simple payback from the water and energy savings associated with replacing an existing pre-rinse spray valve, consider the equipment cost of the replacement pre-rinse spray valve, the water and energy savings as calculated using Equation 2 and Equation 3, respectively, and the facility-specific cost of water, wastewater, and energy. From market research, pre-rinse spray valves typically cost less than $150.

Additional Resources

DOE. Appliance and Equipment Standards Rulemakings and Notices: Commercial Prerinse Spray Valves. www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=69&action=viewcurrent.

EPA's WaterSense program. Pre-Rinse Spray Valves. www.epa.gov/watersense/pre-rinse-spray-valves.

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