WaterSense at Work

Commercial Kitchen Equipment

4.8 Wash-Down Sprayers

Best Management Practices for Commercial and Institutional Facilities

EPA WaterSense

February 2025

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 wash-down sprayers, is part of **Section 4: Commercial Kitchen Equipment**. The complete library 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.

EPA 832-F-23-003
Office of Water
U.S. Environmental Protection Agency
February 2025

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

Wash-down sprayers are hoses with nozzles attached used for a variety of cleaning purposes, including washing countertops, floors, mats, and other kitchen areas. Wash-down sprayers use large volumes of water to provide a high-pressure stream capable of cleaning dirt, grease, and residue from surfaces.

Wash-down sprayers typically have water flow rates of 5 to 7 gallons per minute (gpm) (19 to 26 liters per minute [lpm]), while heavy-duty hoses can deliver higher flow rates from 9 to 20 gpm (34 to 76 lpm).[1,2]

Kitchen staff using a wash down sprayer to clean kitchen floor

Because wash-down sprayers use large volumes of water to perform cleaning tasks, using another cleaning method is the best way to save water. Alternative cleaning methods (e.g., wiping, sweeping, mopping, wet-dry vacuuming, pressure washing, water brooms) require significantly less water.[3]

Operation, Maintenance, and User Education

Facility staff can limit use of wash-down sprayers by implementing cleaning methods that use less water whenever feasible, as described in the sections below. If alternative cleaning methods are not practical for your facility, consider the following best practices for wash-down sprayers:

- Only use wash-down sprayers to clean floors, countertops, and other surfaces. Do not use wash-down sprayers to clean dishware, which should be cleaned with pre-rinse spray valves. See *WaterSense at Work Section 4.1: Pre-Rinse Spray Valves* at

[1] East Bay Municipal Utility District (EBMUD). 2008. *Watersmart Guidebook—A Water-Use Efficiency Plan Review Guide for New Businesses*. Page 9. www.ebmud.com/water/conservation-and-rebates/commercial/watersmart-guidebook/.

[2] New York City Environmental Protection. *Restaurant Managers Guide to Water Efficiency.* www.nyc.gov/assets/dep/downloads/pdf/water/drinking-water/restaurant-managers-guide-to-water-efficiency.pdf.

[3] EBMUD, *op. cit*.

www.epa.gov/watersense/best-management-practices for best management practices for pre-rinse spray valves.

- Because self-closing nozzles can leak or fail, shut off the water supply when the wash-down sprayer is not in use.
- Periodically check your wash-down sprayer for leaks from pipe fittings and connections and tighten connections as necessary.

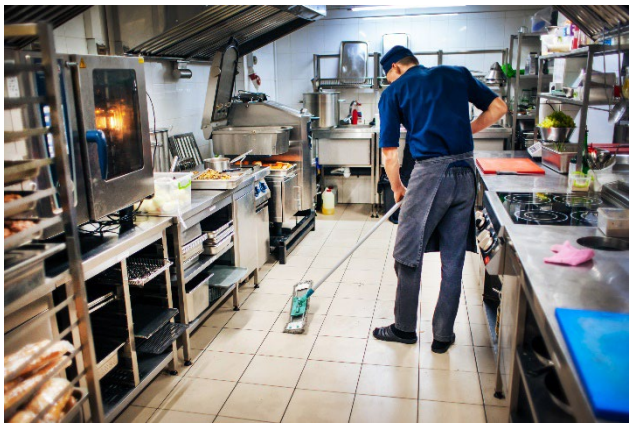
Retrofit Options

To retrofit a wash-down sprayer system to reduce water use, ensure the hose has a self-closing nozzle attached. Consider replacing high-flowing nozzles with a lower intensity, self-closing nozzles with a water flow rate of 5 to 7 gpm [19 to 25 lpm] or less.

Replacement Options

If possible, manually wipe, sweep, or mop surfaces and floors instead of using a wash-down sprayer. Enzyme cleaners can help break down grease and other residue so less water is needed for scrubbing and rinsing floors. After mopping, squeegees can help clear wet or flooded surfaces for faster drying time. Wet-dry vacuums or mechanical floor cleaning systems can also help with more efficient cleaning and drying.

Alternatively, consider replacing a wash-down sprayer with a pressure washer or water broom, both of which use significantly less water than washer-down sprayers. Pressure washers typically flow at 3 gpm (11 lpm) or less. Water brooms typically operate at about half the flow rate of a wash-down sprayer.[4] Select water brooms that use less than or equal to 0.1 gallons (0.38 liters) per minute per linear inch of spray area.



Restaurant staff using dry sweeping method

Savings Potential

Retrofitting your wash-down spray hose with a self-closing nozzle, using other cleaning methods (e.g., wiping, mopping, sweeping, wet-dry vacuuming) instead of wash-down

[4] TRC Companies and Frontier Energy, Inc. 2023. *Technical Design Guide for Advanced Water Heating within the Foodservice Industry: Improving Operating Performance of Hot Water Systems in Commercial Kitchens, Edition 3*. Prepared for the CalNEXT Program administered by Southern California Edison. Page 11. https://caenergywise.com/design-guides/Technical_Design_Guide.pdf.

sprayers, or replacing your wash-down sprayer with a pressure washer or water broom can save both water and energy in a facility.

Wash-Down Sprayer Retrofit or Replacement With Lower Flow Equipment

To calculate the facility-specific water savings, energy savings, and payback associated with retrofitting or replacing a wash-down sprayer with a lower flow nozzle, pressure washer, or water broom, use the following information:

Kitchen staff mopping floor

Current Water Use

To estimate the current water use of an existing wash-down sprayer, identify the following information and use Equation 1:

- Flow rate of the existing wash-down sprayer. High-flowing wash-down sprayers typically have flow rates between 9 and 20 gpm (34 and 76 lpm), while more efficient wash-down sprayers typically flow between 5 and 7 gpm (19 and 26 lpm).[5,6]
- Average daily use time.
- Days of facility operation per year.

Equation 1. Water Use of Wash-Down Sprayer, Pressure Washer, or Water Broom (gallons or liters per year)

= Flow Rate of Equipment x Daily Use Time x Days of Facility Operation

Where:

- Flow Rate of Equipment: Gallons or liters per minute
- Daily Use Time: Minutes per day
- Days of Facility Operation: Days per year

Water Use After Retrofit or Replacement

To estimate the water use after retrofitting an existing wash-down sprayer with a lower-flowing, self-closing nozzle or replacing it with a pressure washer or water broom, use Equation 1, substituting the flow rate of the retrofit nozzle, pressure washer, or water broom. Self-closing nozzles often flow at a rate of 5 to 7 gpm (19 to 26 lpm).[7,8] Pressure

[5] EMBUD, *op. cit.*
[6] NYC Environmental Protection, *op. cit.*
[7] EMBUD, *op. cit.*
[8] NYC Environmental Protection, *op. cit.*

washers can have flow rates of 3 gpm (11 lpm) or less. Efficient water brooms typically operate at 0.1 gallons (0.38 liters) per minute per linear inch of spray area or less.

Water Savings

To calculate water savings that can be achieved from retrofitting or replacing an existing wash-down sprayer, identify the following information and use Equation 2:

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

Equation 2. Water Savings From Wash-Down Sprayer Retrofit or Replacement (gallons or liters per year)

= Current Water Use of Wash-Down Sprayer – Water Use After Retrofit or Replacement

Where:

- Current Water Use of Wash-Down Sprayer: Gallons or liters per year
- Water Use After Retrofit or Replacement: Gallons or liters per year

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Energy Savings

Because wash-down sprayers typically use hot water, a reduction in water use will also result in energy savings. The energy required to heat water depends 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 retrofitting or replacing an existing wash-down sprayer can be estimated using the water savings calculated using Equation 2 and the assumptions presented in Equation 3 on the next page.

Payback

To calculate the simple payback from the water and energy savings associated with a wash-down sprayer retrofit or replacement, consider the equipment and installation cost of the retrofit or replacement wash-down sprayer, pressure washer, or water broom; the water and energy savings as calculated respectively using Equation 2 and Equation 3; and the facility-specific cost of water, wastewater, and water heating fuel (e.g., electricity, natural gas).

Equation 3. Energy Savings From Wash-Down Sprayer Retrofit or Replacement (kWh of electricity or Mcf of natural gas per year)

= Water Savings (gallons or liters) x Average Percent of Wash-Down Sprayer Water That Is Hot x (Energy per Gallon or Liter Heated ÷ Water Heater Efficiency)

Where:

- Water Savings: Gallons per year (or liters per year)
- Average Percent of Faucet Water That Is Hot: Facility-specific
- Energy per Gallon or Liter Heated [assuming 75°F (24°C) 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):
  - 1.0 for an electric hot water heater; or
  - 0.75 for a natural gas hot water heater

Wash-Down Sprayer Replacement With Alternative Cleaning Methods

To calculate the facility-specific water savings, energy savings, and payback associated with replacing a wash-down sprayer with alternative cleaning methods (e.g., wiping, sweeping, mopping, squeegeeing, wet-dry vacuuming), use the following information.

Current Water Use

To estimate the current water use of an existing wash-down sprayer, use Equation 1.

Water Use After Replacing Wash-Down Sprayer

Replacing a typical wash-down sprayer with wiping and mopping can save a significant amount of water, or eliminate water with sweeping and wet-dry vacuuming. To estimate water use from wiping and mopping, identify the following information and use Equation 4.

- Amount of water needed to fill buckets. It takes about 10 to 15 gallons (38 to 57 liters) to fill a mop bucket.[9] Buckets for wiping counters may be smaller.
- Average number of times bucket is filled per day.
- Days of facility operation per year.

[9] TRC Companies and Frontier Energy, Inc. *op. cit*.

Equation 4. Water Use for Filling Buckets (gallons or liters per year)

= Amount of Water Needed to Fill Bucket x Number of Bucket Fills per Day x Days of Facility Operation

Where:

- Amount of Water Needed to Fill Bucket: Gallons or liters per bucket
- Number of Bucket Fills per Day: Buckets filled per day
- Days of Facility Operation: Days per year

Water Savings

To calculate water savings that can be achieved from replacing a wash-down sprayer with alternative cleaning methods, identify the following information and use Equation 5:

- Current water use as calculated using Equation 1.
- Water use for filling buckets as calculated using Equation 4.

Equation 5. Water Savings From Wash-Down Sprayer Replacement With Alternative Cleaning Methods (gallons or liters per year)

= Current Water Use of Wash-Down Sprayer – Water Use for Filling Buckets

Where:

- Current Water Use of Wash-Down Sprayer: Gallons or liters per year
- Water Use for Filling Buckets: Gallons or liters per year

Energy Savings

Because wash-down sprayers typically use hot water, a reduction in water use will also result in energy savings. The energy required to heat water depends 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 wash-down sprayer can be estimated using the water savings calculated using Equation 5 and the assumptions presented in Equation 3.

Payback

To calculate the simple payback from the water and energy savings associated with replacing a wash-down sprayer with alternative cleaning practices, consider the broom, mop, bucket, squeegee, and/or wet-dry vacuum equipment cost; the cost of additional cleaning agents (such as an enzyme detergent); the water and energy savings as calculated respectively using Equation 5 and Equation 3; and the facility-specific cost of water, wastewater, and water heating fuel (e.g., electricity, natural gas).

Additional Resources

East Bay Municipal Utility District. 2008. *WaterSmart Guidebook—A Water-Use Efficiency Plan Review Guide for New Businesses*. Pages FOOD8-9. www.ebmud.com/water/conservation-and-rebates/commercial/watersmart-guidebook.

TRC Companies and Frontier Energy, Inc. 2023. *Technical Design Guide for Advanced Water Heating within the Foodservice Industry: Improving Operating Performance of Hot Water Systems in Commercial Kitchens, Edition 3*. Prepared for the CalNEXT Program administered by Southern California Edison. https://caenergywise.com/design-guides/Technical_Design_Guide.pdf.

New York City Environmental Protection. *Restaurant Managers Guide to Water Efficiency*. www.nyc.gov/assets/dep/downloads/pdf/water/drinking-water/restaurant-managers-guide-to-water-efficiency.pdf.

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United States Environmental Protection Agency
(4204M)
EPA 832-F-23-003
February 2025
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