

EPA Pre-Rinse Spray Valves Research Study Scope

Purpose of research on pre-rinse spray valves:

The Energy Policy Act of 2005 (EPAAct 2005) restricts pre-rinse spray valve sales in the United States to those with flow rates of 1.6 gallons per minute (gpm) or lower, as tested by the American Society for Testing and Materials (ASTM) F2324-03 standard test method for pre-rinse spray valves. ASTM F2324-03 also includes a test protocol designed to assess a pre-rinse spray valve's ability to remove food waste from plates that is measured in "cleanability," or in the time in seconds per plate cleaned. EPAAct 2005 does not specify a necessary performance level based on the cleanability portion of the test protocol.

In recent years, manufacturers have begun to meet demands for more efficient products and have introduced ultra-high-efficiency pre-rinse spray valve models to the market with rated flow rates of 1.0 gpm or less. These spray valves have demonstrated ASTM-tested cleanability times equal to or better than standard models. However, minimal research has been done, particularly with these ultra-high-efficiency spray valves, to evaluate actual field usage times, water and energy savings, and customer satisfaction.

The U.S. Environmental Protection Agency (EPA) would like to determine if high-efficiency and ultra-high-efficiency pre-rinse spray valves perform as well as or better than their conventional counterparts (those with flow rates at or around the EPAAct 2005 requirement of 1.6 gpm) in the field, as performance is critical for EPA to ensure the long-term water and energy savings associated with these products. Particularly, EPA is interested in determining whether users spend more time removing food waste from dishes using high-efficiency and/or ultra-high-efficiency pre-rinse spray valves than conventional valves, and, if so, whether the usage time increases to the point that it negates water and energy savings and impacts user satisfaction.

Questions to be answered through independent, third-party research:

To assist in the development of a performance specification for pre-rinse spray valves, EPA seeks data that answers the following questions:

1. How do water usage and time usage vary among pre-rinse spray valves currently on the market?
2. Do usage times in the field correlate to cleanability times achieved using the ASTM F2324-03 test method?
3. How do flow rate, actual field usage time, and ASTM-tested cleanability time correlate to user satisfaction?

EPA is seeking independent data to answer the above questions. Below is an outline of the ideal research study scope.

Scope:

Goal:

- For at least one week each, install at least two models of applicable (see next bullet) pre-rinse spray valves from each flow rate category listed below in a minimum of 10 establishments, for a total of eight spray valves per establishment. The two pre-rinse spray valves in each category should be made by different manufacturers whenever possible.
 - Category 1: pre-rinse spray valves with a rated flow rate ≥ 1.4 to 1.6 gpm
 - Category 2: pre-rinse spray valves with a rated flow rate ≥ 1.2 to <1.4 gpm
 - Category 3: pre-rinse spray valves with a rated flow rate ≥ 1.0 to <1.2 gpm
 - Category 4: pre-rinse spray valves with a rated flow rate < 1.0 gpm
- Applicable pre-rinse spray valves must have posted ASTM F2324-03 test results from the Food Service Technology Center. A list of applicable pre-rinse spray valve models can be found at www.fishnick.com/equipment/sprayvalves.

Equipment Needed for Study:

- Graduated pail/container (one per person collecting data simultaneously)
- Stop watch (one per person collecting data simultaneously)
- Pressure gauge (one per establishment)
- Usage counters/totalizers (one per establishment for mixed water spigot; two per establishment for separate hot and cold water spigots)
- Pre-rinse spray valves (enough to have one installed at each establishment every week; can be used interchangeably among establishments)
- Thermometer (one per person collecting data simultaneously)
- Tape measure (one per person collecting data simultaneously)
- Digital camera (one per person collecting data simultaneously)

Baseline Measurements at Participating Establishments:

- Identify the make and model of the existing pre-rinse spray valve.
- The original valve should be monitored during the pre-installation data collection period for at least one week, and the following measurements should be taken:
 - Using a stop watch and graduated pail, measure and record the baseline flow rate of the existing pre-rinse spray valve at the beginning of the pre-installation data collection period.
 - Using a pressure gauge, measure and record the flowing and static water pressure of the existing pre-rinse spray valve at least once during the pre-installation data collection period.
 - Using the usage counter/flow totalizer, measure and record the total gallons used and/or the total time spent using the existing pre-rinse spray valve during the pre-installation data collection period.
 - Using a thermometer, measure and record the hot- and cold-water temperature from a separate faucet (not using the pre-rinse spray valve) at the establishment at the beginning of the pre-installation data collection period. This will establish a baseline for calculating energy savings.
 - Using a thermometer, measure and record the outlet water temperature from the existing pre-rinse spray valve at the beginning of the pre-installation data collection period.

- Provide a description and photo documentation of the entire pre-rinse unit, including measurements of the inside hose diameter and hose length, description of hot water and cold water spigots (combined, separate, etc.), and descriptions of any other important parameters.
- At the end of the pre-installation data collection period, dishwashers should be interviewed briefly to assess user satisfaction, answering at least the following questions:
 - Are you satisfied with the current pre-rinse spray valve?
 - What do you like or dislike about the valve?
 - Do you adjust the temperature of the pre-rinse spray valve during the day, and if so, why?
- Establishment managers should provide the following business information for the pre-installation testing period:
 - Number of customers served
 - Any information about atypical business (i.e., special events)
- Establishment managers should also indicate:
 - If their water is heated by electricity, natural gas, or other means
 - If their pre-rinse spray valves use hot water, cold water, or both
 - If there is a mixing valve on their faucet that feeds their pre-rinse spray valve

New Installation for Each Participating Establishment:

- The eight pre-rinse spray valves (two from each flow rate category) should be installed for at least one week each during the test period. The test should be a blind test—the user should not know the flow rate of the valve being installed. The order of installation should be done at random (i.e., flow rate should not ramp up or ramp down during the study; pre-rinse spray valve selection per week should be randomly generated). See example schedule matrix below.

Flow Rate Category	Pre-Rinse Spray Valve 1	Pre-Rinse Spray Valve 2
≥ 1.4 to 1.6 gpm	Model A	Model B
≥ 1.2 to <1.4 gpm	Model C	Model D
≥ 1.0 to <1.2 gpm	Model E	Model F
< 1.0 gpm	Model G	Model H
Week	Valve Installed	
1	Model B	
2	Model G	
3	Model C	
4	Model A	
5	Model E	
6	Model F	
7	Model D	
8	Model H	

- All new pre-rinse spray valves should be installed on the existing pre-rinse units at each establishment (the only variable will be the spray valve, not the entire spray unit; spray units may vary by location), and the following measurements should be taken:
 - Using a stop watch and graduated pail, measure and record the flow rate of each pre-rinse spray valve at the beginning of each installation data collection period.
 - Using a pressure gauge, measure and record the flowing and static water pressure of each pre-rinse spray valve at least once during each installation period.

- Using the usage counter/flow totalizer, measure and record the total gallons used and/or the total time spent using each pre-rinse spray valve during each installation period.
- Using a thermometer, measure and record the hot- and cold-water temperatures from a separate faucet (not using the pre-rinse spray valve) at the establishment at the beginning of each installation period.
- Using a thermometer, measure and record the outlet water temperature from each pre-rinse spray valve at the beginning of each installation period.
- At the end of each installation period, dishwashers should be interviewed briefly to assess user satisfaction, answering at least the following questions:
 - Were you satisfied with the pre-rinse spray valve?
 - What did you like or dislike about the valve?
 - Did you have to adjust the water temperature at all while using the valve? If so, did you adjust it to make the water hotter or colder? Why?
- Establishment managers should provide the following business information for each installation period:
 - Number of customers served
 - Any information about atypical business (i.e., special events)

Data to provide to EPA:

- Background information regarding the facility and installation conditions at each site, including:
 - Inside hose diameter and hose length;
 - Hot water and cold water spigot descriptions (combined, separate, etc.);
 - Hot and cold water temperature (from a separate faucet);
 - Pre-rinse spray valve outlet temperature;
 - One photograph of the pre-rinse spray unit set up from each establishment;
 - Existing pre-rinse spray valve make and model; and
 - Existing pre-rinse spray valve measured flow rate, flowing water pressure, static water pressure, and total baseline water and/or time usage recorded during the pre-installation period.
- Make, model, and measured flow rate of each pre-rinse spray valve being tested and flowing water pressure, static water pressure, outlet water temperature, and total water and/or time usage recorded for each tested pre-rinse spray valve during each installation period.
- Hot and cold water temperature (from a separate faucet) collected during each installation period.
- A description of the random pre-rinse spray valve installation order for each establishment (schedule matrix would suffice).
- Responses to the survey of dishwashers (one for the existing spray valve and one for each tested model) and responses to the survey questions from each establishment manager (for baseline and each separate installation period).