CEE Commercial Kitchens Initiative
Program Guidance on Pre-Rinse Spray Valves

The dishwashing operation in a typical restaurant consumes over two-thirds of all the water used by that establishment. In some cases, nearly one-half of the water used in dishwashing is consumed by the pre-rinse spray valve. A great deal of energy is used to heat this water. For electric water heaters, estimates generally range from about 5-10 gallons of water heated per kWh. For gas water heaters, it is estimated that just over 2 gallons of hot water can be heated per cubic foot of natural gas.

Low-flow, pre-rinse spray valves can be a good opportunity to save water while maintaining equivalent cleaning performance over recent baseline models. Increased water efficiency correlates to direct savings in energy by reducing the amount of water that needs to be heated. The combination of water and energy savings makes efficient pre-rinse spray valves a very attractive product for both efficiency programs and consumers.

A new national standard will require all pre-rinse spray valves manufactured after January 1, 2006, to have a maximum flowrate of 1.6 gallons per minute (gpm). The purpose of this document is to provide guidance to efficiency program administrators on water and energy saving opportunities in light of the new standard.

Product Definition

A pre-rinse spray valve is a handheld device that uses a spray of water to remove food waste from dishes prior to cleaning in a commercial dishwasher. Pre-rinse spray valves consist of a spray nozzle, a squeeze lever that controls the water flow, and a dish guard bumper. Models may include a spray handle clip, allowing the user to lock the lever in the full spray position for continual use. They are usually placed at the entrance to a commercial dishwasher and can also be located over a sink, in conjunction with a faucet fixture.

Pre-Rinse Spray Valve Industry

According to Foodservice Equipment Reports' *2004 Worldwide Buyers Guide*, there are approximately 18 companies that manufacture pre-rinse spray units. The three largest manufacturers are Fisher Manufacturing (Fisher), Chicago Faucets (Chicago), and T&S Brass and Bronze Works, Inc (T&S).

Product Performance

Pre-rinse spray valve performance is based on flow rate (at a particular pressure) and cleaning performance. A low-flow spray valve with equivalent (or faster) cleaning performance indicates a more-efficient model (high-efficiency spray valve). Standardized test procedures have been

developed by PG&E's Food Service Technology Center (FSTC) and approved by the ASTM to gauge pre-rinse spray valve performance for both flow and cleanability.[1]

Flow Rate: While the new national standard requires all pre-rinse spray valves manufactured after January 1, 2006, to have flow rates of 1.6 gpm or less, the current stock of pre-rinse spray valves have flow rates ranging from 1.0-to-5.0 gpm. Pre-rinse spray valves with flow rates of 1.6 gpm or less at 60 psi are recommended.

Cleanability: Improved spray valve design enables low-flow products to clean dishes as effectively as standard models. To ensure that spray valve performance is maintained, program administrators are encouraged to include a cleanability requirement (expressed as seconds per plate) in any program design. The California Urban Water Conservation Council administers one of the largest pre-rinse spray valve programs, *Rinse & Save*, which has a cleanability requirement of 21 seconds or less.[2] Other water and energy-efficiency programs use 26 seconds per plate as a threshold. The new national standard does not address cleanability, but allows California's statewide standard to remain in effect, which sets a maximum pre-rinse spray valve cleaning time of 30 seconds per plate.[3] While the cleanability test has recognized limitations, such as repeatability, there is no alternative industry test to demonstrate that low-flow products will meet consumer expectations for cleaning performance at this time.

Performance Assumptions

Program administrators should be aware of the following assumptions associated with pre-rinse spray valve performance.

Application: Pre-rinse spray valves designed for commercial dishwashing should be differentiated from spray valves used for filling pots or kettles which typically have much higher flow rates.

Water Pressure: While the ASTM test procedure measures performance under normal water pressure (60 psi), extremely low or high water pressure can impact performance. Program administrators are strongly encouraged to investigate local water pressure conditions before launching a spray valve program.

> *High Water Pressure*. To avoid excess splashing caused by high water pressure (i.e., 80 psi and above), program administrators should advise consumers to call their local water agency or a plumber to inquire about installing a pressure regulation device. Educating consumers about opportunities to address high water pressure can help save water, energy, and maintenance costs throughout the facility.
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> *Low Water Pressure.* Longer cleaning times caused by low water pressure (40 psi and below) can result in customer dissatisfaction with low-flow products. Program administrators should be aware of the potential impact low water pressure can have on performance and educate consumers about correcting low water pressure conditions or identifying spray valves appropriate for the conditions. Further, program administrators may not want to include pre-rinse spray valves if local water pressure is 40 psi or below given the impact on performance.

[1] ASTM Standard F 2324-03: *Standard Test Method for Pre-Rinse Spray Valves*.
[2] See the California Urban Water Conservation Council website: www.cuwcc.org/sprayvalves.lasso
[3] See the California Energy Commission website: www.energy.ca.gov/appliances/2005rulemaking

Hours of Operation: How long pre-rinse spray valves are used each day can have a big impact on potential water and energy savings. Typically, hours of operation correlate closely with the size of the food service operation. For instance, pre-rinse spray valves are frequently operated 30-60 minutes per day in small, quick-service restaurants; 1.5-2.0 hours per day in medium-sized, casual dining restaurants; and 3.0-4.0 hours per day in large, institutional establishments, such as cafeterias.

Temperature: Incoming water temperatures can vary significantly by region across the country. Water temperatures at the spray valve can also vary (optimal operating conditions are at 120°F). Both can affect spray valve performance and potential savings.

Water Heater Efficiency: Assumptions regarding water heater efficiency (electric or gas) will impact energy saving estimates.

Product Life: A typical pre-rinse spray valve is expected to last 5 years.

Potential Energy and Water Savings

As noted above, water and energy savings will vary with the number of hours a spray valve is used per day. Program administrators can estimate potential program impacts by surveying local food service customer types, sizes, and spray valve usage patterns. In addition, PG&E's Food Service Technology Center provides a free calculator tool on its website to help administrators estimate potential savings under various operating conditions.[4] The tables below demonstrate typical water and energy savings for a casual dining restaurant that uses a pre-rinse spray valve 1.5 hours per day. Actual results will vary based on local conditions.

Natural Gas Water Heating Example

	New Spray Valve	Old Spray Valve	Savings
Flow Rate (gpm)	1.60	3.20	1.60
Annual Water Consumption (Gallons)	51,840	103,680	51,840
Annual Water Heating Energy (therms)	432	864	432
Combined Annual Water and Sewer Cost ($)	346.50	693.00	346.50
Annual Water Heating Cost ($)	690.92	1,381.85	690.93
Overall Annual Cost ($)	1,037.42	2,074.85	1,037.43

Assumes spray valve operation 1.5 hours per day, 360 days per year, 70 percent efficient natural gas-fired water heater, 70 degree water temperature rise, natural gas costs of $1.00 per therm, water costs of $2.00 per ccf and sewer costs of $3.00 per ccf.

Electric Hot Water Heating Example

	New Spray Valve	Old Spray Valve	Savings
Flow Rate (gpm)	1.60	3.20	1.60
Annual Water Consumption (Gallons)	51,840	103,680	51,840
Annual Water Heating Energy (kWh)	9,323	18,646	9,323
Combined Annual Water and Sewer Cost ($)	346.50	693.00	346.50
Annual Water Heating Cost ($)	932.28	1,864.57	932.29
Overall Annual Cost ($)	1,278.78	2,557.57	1,278.79

Assumes spray valve operation 1.5 hours per day, 360 days per year, 95 percent efficient electric water heater, 70 degree water temperature rise, electric costs of $0.10 per kwh, water costs of $2.00 per ccf and sewer costs of $3.00 per ccf.

[4] See PG&E's Food Service Technology Center website: http://www.fishnick.com/tools/watercost/

Program Implications

After January 1, 2006 consumers will have no choice but to buy pre-rinse spray valves with standard flow rates of 1.6 gpm (once inventories of pre-standard units are depleted). While products are available with flow rates below 1.6 gpm, the savings potential compared to the new standard will likely make it difficult for program administrators to justify incentive programs based on specified performance levels. Program administrators are advised to investigate local water pressures before adding pre-rinse spray valves to their commercial kitchen programs since these local operating conditions can impact product performance and customer satisfaction.[5]

Nevertheless, program administrators are encouraged to include pre-rinse spray valves in their portfolio of high-efficiency, commercial kitchen products. Education and demonstration programs are needed to raise consumer awareness about appropriate pre-rinse spray valve applications, improvements in product design, and effectiveness in keeping cleaning times low.

Commercial kitchen customers and equipment distributors need to be aware of the benefits of high-efficiency spray valves and to learn how best to identify them. Since the new national standard does not address cleaning performance, program administrators are encouraged to use their marketing and outreach resources to promote higher-performance products based on cleanability rather than focusing on products with flow rates lower than the national standard.

Successful applications of low-flow, pre-rinse spray valves can help build consumer interest in other energy and water saving opportunities addressed in CEE's Commercial Kitchens Initiative, such as high-efficiency fryers, ice-makers, refrigerators, and freezers.[6] Finally, administrators are encouraged to work closely with retailers, distributors and installers to promote greater awareness in the market of high-efficiency commercial kitchen equipment, including pre-rinse spray valves.

Given that the installed base of spray valves has flow rates ranging from 1 to 5 gpm at 60 psi, there are energy and water savings opportunities available through direct installation and early retirement programs. With a direct-install approach, program administrators can be assured of near-term savings because they will control which product is selected, can be assured that it is properly installed, and can remove the old model ensuring that it will not be re-installed elsewhere. Consumer education is critical to help consumers understand the product's value and to help consumers identify products with similar performance in the future.

Product Availability

Product lists of ASTM-tested, pre-rinse spray valves are available through PG&E's Food Service Technology Center - www.fishnick.com/saveenergy/sprayvalves/.

Products meeting the California statewide standard will be listed on the California Energy Commission's website in January 2006 - www.energy.ca.gov/appliances/.

[5] If local conditions permit, it may be cost-effective to promote pre-rinse spray valves with flow rates less than the national standard (1.6 gpm).

[6] See the Consortium for Energy Efficiency's website: www.cee1.org