**Work Paper PGECOFST125**

**Pre-Rinse Spray Valve**

**Revision # 0**

**Pacific Gas & Electric Company**

**Customer Energy Solutions**

**Low-Flow Pre-Rinse Spray Valves**

**Measure Codes FS001**

# At-a-Glance Summary

|  |  |
| --- | --- |
| **Applicable Measure Codes:** | **FS001** |
| **Measure Description:** | Commercial Pre-Rinse Spray Valve (PRSV)  1.15gpm flow rate |
| **Energy Impact Common Units:** | Each |
| **Base Case Description:** | Installed Case for PG&E Territory after 2002-6 spray valve programs: 1.4 gpm flow rate. |
| **Base Case Energy Consumption:** | Source: PG&E Calculations,  186 Therms per year |
| **Measure Energy Consumption:** | Source: PG&E Calculations,  153 Therms per year |
| **Energy Savings**  **(Base Case – Measure):** | Source: PG&E Calculations,  33 Therms per year |
| **Costs Common Units:** | Commercial Pre-Rinse Spray Valve (PRSV) |
| **Base Case Equipment Cost ($/unit):** | Source: PG&E Calculations,  $40 |
| **Measure Equipment Cost ($/unit):** | Source: PG&E Calculations,  $89 |
| **Measure Incremental Cost ($/unit):** | Source: PG&E Calculations  $49  ROB, NC = measure equipment cost – base case equipment cost |
| **Effective Useful Life (years):** | Source: Koeller, *Pre-Rinse Spray Valve Programs: How Are They Really Doing?* M&V Report,  five years |
| **Measure Application Type:** | Replace on Burnout (ROB), or New Construction (NC). |
| **Net-to-Gross Ratios:** | Source: DEER 2014 Com Default > 2yrs  0.7 |
| **Important Comments:** |  |

# Work Paper Approvals

The following Manager(s) approved this workpaper through the PG&E Electronic Data Routing System under Routing Requisition # \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |
| --- |
|  |
| **Grant Brohard**  Manager, Technical Product Support |
| **Carolyn Weiner**  Manager, Appliance Products |

# Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision #** | **Revision Date** | **Section-by-Section Description of Revisions** | **Author (Company)** |
| 0 | September 17, 2014 | New proposed work paper for qualifying PRSV ≤ 1.15 gpm for rebate and Direct Install. | Kong Sham (Fisher Nickel)  Charlene Spoor (PG&E) |

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# Section 1. General Measure & Baseline Data

## 1.1 Product Measure Description & Background

This work paper documents the rationale for the Commercial Pre-Rinse Spray Valves measures as listed in the Commercial Food Service Catalog. The Commercial Food Service Catalog is part of Pacific Gas and Electric Company’s Customer Energy Efficiency Program. PG&E offers incentives to non-residential customers for installing qualifying lighting, refrigeration, air-conditioning, food service, and agricultural equipment

***Catalog Description –***

**FS001:** The commercial pre-rinse spray valve must have a tested flow rate of 1.15 gpm or less using ASTM Standard F2324 Standard Test Method for Prerinse Spray Valves[[1]](#endnote-1).

***Program Restrictions and Guidelines***

***Terms and Conditions:***

This measure includes new commercial pre-rinse spray valves that meet the qualifications listed in Table 1. Used or rebuilt equipment is not eligible. Customers must provide proof that the appliance meets the requirements in Table 1.

Table 1 Energy Efficiency Requirements for Commercial Pre-Rinse Spray Valves

|  |  |  |
| --- | --- | --- |
| **Measure Code** | **Spray Valve Type** | **Flow Rate (gpm)** |
| FS001 | Spray Valve | ≤1.15 gpm\* |

\*Based on the ANSI/ASTM F2324

***The rebate is downstream, provided to the contractor or customer at the time of sale / installation upon receipt of sales data, application, and invoice. This is a rebated or Direct install program. Direct install participants will be required to provide a measured flow rate test and proper documentation (i.e. picture and evaluation form) at the time of customer delivery.***

***Direct install applicants must demonstrate that existing water efficiency rebates are not locally available for the targeted areas.***

***Market Applicability:***

This measure is applicable to any commercial cooking application, including (but not limited to) casual dining and quick service restaurants, food stands, hotels, motels, schools, colleges and recreational facilities.

## 1.2 Product Technical Description

Pre-rinse spray valves (PRSV), also referred to as spray nozzles or spray heads are used in various food service applications, such as restaurants and cafeterias to remove loose food and debris from plates and other dishes prior to loading them in the dishwasher. PRSVs range in flow rate from 0.65 gpm to 4.5 gpm. As part of Energy Policy Act of 2005, PRSVs have been federally regulated to have a flow rate ≤1.6 gpm as determined by applying the American Society for Testing and Materials (ASTM) Standard Test Method for Performance of Pre-Rinse Spray Valves (ANSI/ASTM F2324-03). Because hot water is dispensed at the PRSV to rinse the plates more effectively, the reduction in flow rate results in the energy and water savings.

## 1.3 Measure Application Type

The DEER Measure Cost Data Users Guide[[2]](#endnote-2) found on [www.deeresources.com](http://www.deeresources.com) under *DEER2011 Database Format* hyperlink, DEER2011 for 13-14[[3]](#endnote-3), spreadsheet *SPTdata\_format-V0.97.xls*, defines the terms as follows:

Table 2 Measure Application Type[[4]](#endnote-4)

*Identifies the measure application type in the Measure Implementation table in DEER2014.*

|  |  |  |
| --- | --- | --- |
| **Code** | **Description** | **Comment** |
| ER | Early retirement | *measure applied while existing equipment still viable, or retrofit of existing equipment* |
| ROB | Replace on Burnout | *measure applied when existing equipment fails or maintenance requires replacement* |
| NC | New Construction | *measure applied during construction design phase as an alternative to a code-compliant standard design* |

This measure is focused on ROB and NC applications only.

Spray valves replaced through this Rebate or Direct Install Program are at the end of their effective useful life. As stated in the EM&V studies conducted on PRSVs, *Pre-Rinse Spray Valve Programs: How Are They Really Doing?[[5]](#endnote-5),* the effective useful life of PRSVs is five years. The last California Urban Water Conservation Council (CUWCC) Pre-Rinse Spray Head Distribution Programs was completed 2006 with many of those pre-rinse valves still installed in the field. The Food Service Technology field team frequently finds malfunctioning nozzles installed past their EUL that have flow rates exceeding 3 gpm.

## 1.4 Product Base Case and Measure Case Data

## 1.4.1 DEER Base Case and Measure Case Information

The 2014 DEER database does not contain information on energy use, savings, equipment costs, hour of operation, or effective useful life for a PRSV measure.

***Base Case Costs and Measure Case Costs:***

The base case and measure case costs are calculated and found in section 1.4.4.

***Net-to-Gross Assumption:***

DEER 2014[[6]](#endnote-6) does not specifically list commercial food service appliances, the default used for new commercial measures is 0.7. Table 3 below summarizes all applicable DEER based Net-to-Gross ratios for programs that may be used by this measure.

Table 3 Measure Application Type

|  |  |
| --- | --- |
|  |  |
| Program Approach | NTG |
| All Com-Default<2yrs | 0.7 |

***In-service rate/first year installation rate****:*

The in–service rate was not found in DEER or any supporting documentation. We have therefore assumed the ISR is 1.0 for all measures based on engineering judgment.

See Section 1.1 Terms and Conditions and Market Applicability to reference the type of program delivery mechanism and customer status used to determine this entry.

## 1.4.2 Codes & Standards Requirements Base Case and Measure Information

***Federal Standards:***

This equipment base case falls under the Energy Policy Act of 2005[[7]](#endnote-7). Under this regulation, the following is required: ASTM Standard Test Method for the Performance of Pre-Rinse Spray Valves (F2324-03) for estimating the energy and water consumption and cleaning performance of the spray valve. Under the regulations, water consumption must be less than 1.6 gpm and have a cleanability time of less than 26 seconds. However, the base case for this work paper is established to be 1.40 gpm reflecting the programs conducted by the CUWCC in California from 2002-2006. A majority of the spray valves installed through these programs were a mixture of 1.15 gpm and 1.42 gpm nozzles, therefore the installed base for PG&E territory is an estimated 1.30 gpm.

This equipment’s measure case is based on a 28.1% reduction in flow rate compared to the Federal standard and a 17.9% reduction compared to the installed base in PG&E territory. The measure cases for this work paper shall have flow rates ≤ 1.15 gpm.

Table 4 Codes and Standards Requirements for Base Case and Measure Case

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Federal Std. Description** | **Base or Measure Case** | **Value** | **Units** | **Code Source or Reference** |
| Commercial PRSV | *Base* | *1.6 gpm* | *Spray Valve* | *Energy Policy Act Section 119 Stat 632, pp 40* |
| Commercial PRSV | *Base* | *1.4 gpm* | *Spray Valve* | *Installed Base* |

***Title 20:***

This measure falls under Title 20[[8]](#endnote-8) of the California Public Utility Commission (CPUC) Energy Regulations. Under this regulation, the following is required: ASTM Standard Test Method for the Performance of Pre-Rinse Spray Valves (F2324-03) for estimating the energy and water consumption and cleaning performance of the spray valve. Under the regulations, water consumption must be less than 1.6 gpm and have a cleanability time of less than 26 seconds.

Table 5 Title 20 Reference

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Title 20 Std. Description** | **Base or Measure Case** | **Value** | **Units** | **Code Source or Reference** |
| Commercial PRSV | *Base* | *1.6 gpm* | *Spray Valve* | *Table H-1 Standards for Plumbing fittings* |

***Title 24:***

This measure does not fall under Title 24 of the California Energy Regulations

## 1.4.3 EM&V, Market Potential, and Other Studies – Base Case and Measure Case Information

Pre-rinse spray valves have been included as part of energy efficiency programs in California, Washington, and Canadian cities for several years. These programs have undergone evaluation studies validating the effectiveness of high efficiency spray valves and their operational characteristics. Two separate studies conducted by Tso and Koeller and SBW Consulting document the baseline operating hours, baseline flow rates, proposed operating hours, proposed flow rates, mixed water temperature, and supply water temperature for spray valves. The results of these studies are used as the basis for energy savings calculations for this measure.

***1.4.3.1 Study #1[[9]](#endnote-9)*** *Pre-Rinse Spray Valve Programs: How Are They Really Doing?*

The study in 2005 by Bing Tso and John Koeller randomly selected 16 different commercial food service sites out of 17,000 spray valves installation sites for monitoring and verification studies. All of these sites were locations where a high flow PRSV was initially measured for flow rate, hours of operation and mixed water temperature, and subsequently monitored with a low flow nozzle. The study was conducted in foodservice facilities throughout California, Washington, and Canadian cities over the course of two years from 2003 to 2005. The research was conducted through a combination of equipment monitoring and surveys and used to evaluate the baseline operating hours, baseline flow rates, proposed operating hours, proposed flow rates, mixed water temperature, and supply water temperature for each of the facilities.

***Energy Savings Calculation Assumptions:***

* Mixed water temperatures for food service establishments averaged 114.1°F during the monitoring period.

***Hours of Operation****:*

* The baseline operating hours were determined using the results of existing evaluation studies for restaurant facilities that included baseline operating hours of 0.79 hours/day for a 2.92 gpm unit and the proposed operating hours of 1.02 hours/day for a 1.18 gpm unit. The linear relationship between these two parameters yielded an equation that was utilized to calculate operating hours for the baseline unit at 1.40 gpm. The equation is as follows:

Hours/day = -0.1322 x Flow Rate +1.176

* The measure flow rate is the rated flow of 1.15 gpm for the qualifying PRSVs. The measure hours of operation are consistent with the results of evaluation studies for previously implemented pre-rinse spray valve programs.

Table 6 Base and Measure Case Operating Hours

|  |  |  |
| --- | --- | --- |
| **Equipment Type** | **Rated Flow (gpm)** | **Operating Hours (Hr/Day)** |
| Base Case | 1.40 | 0.991 |
| Qualifying Measure | 1.15 | 1.024 |
| Base Case- Measure Case |  | 0.033 |

* Using the formula provided in the study documented below, the difference in the hours of operation between the base and measure case is 0.033 hours per day (3%) and is assumed to be negligent for this work paper. Therefore it is assumed that the operating hours of spray valves at or below 1.4 gpm will have 1.00 hours of operation per day.

***Effective Useful Life:***

* For pre-rinse spray valves, the EUL of 5 years is taken from the 2007 impact and process evaluation of the California Urban Water Conservation Council 2004-5 Pre-Rinse Spray Valve Installation Program (Phase 2) study.

***1.4.3.2 Study #2*** *SBW (2007) Impact and Process Evaluation Final Report for the CUWCC Pre-Rinse Spray Valve Program[[10]](#endnote-10)*

This study is an EM&V study conducted by SBW Consulting to document the findings and results of the second phase of the CUWCC Spray Valve Program. The research was conducted through a combination of equipment monitoring and surveys and used to evaluate the baseline operating hours, baseline flow rates, proposed operating hours, proposed flow rates, mixed water temperature, and supply water temperature for each of the facilities and was submitted to the CPUC. The EM&V study documented 195 different spray valve installations with 29 of the installations monitored for flow rate and temperature for at least one month.

***Energy Savings Calculation Assumptions:***

* Supply water temperatures in PG&E service territory for an average annual temperature of 63.2°F.
* Mixed water temperatures were not used from this report because it favored grocery type establishments that had a lower mixed water temperature unrepresentative of foodservice as a whole.

## 1.4.4 Assumptions and Calculations from other sources—Base and Measure Cases

There are no other assumptions of calculations from other sources used to determine base and measure case. Field representatives from the Food Service Technology Center agree with the numbers determined in the spray valve case study documented in 1.4.3.

***1.4.5 Time-of-Use Adjustment Factor***

We are required by CPUC decision 06-06-063 dated June 29, 2006 to apply time-of-use (TOU) adjustment factors on residential A/C and commercial A/C (packaged and split-system direct-expansion cooling) measures only. Since this is not an A/C measure, the TOU adjustment factor is 0.

The specific values and results are summarized in Table 8.

Table 7 TOU Adjustment Factors

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure** | ***kWAC*** | ***kWTotal*** | **%** |
| Commercial Cooking Equipment | 0 | 0 | 0 |

***1.5 Summary of Inputs for Savings Calculations***

The following table provides references to sections that document the inputs for calculation:

Table 8 Inputs for Savings Calculations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Input Variable** | **Variations** | **Base Case 1 Average Value** | **Measure Case Average Value** | **Reference Section** |
| **Electric Savings** | None |  |  | *Section 1.4.1* |
| **Gas Savings** | None | N/A | 43.9 | *Section 2.3* |
| **Hours of operation** | None | 1.00 | 1.00 | *Section 1.4.3.1* |
| **Full Cost** | None | N/A | $49 | *Section 4.3.2* |
| **Incremental Cost** | None | N/A | $49 | *Section 4.3.2* |
| **EUL /RUL** | None | 5 | 5 | *Section 1.4.3.1* |
| **NTG** | None | 0 | 1.0 | *Section 1.4.1* |
| **ISR** | None | 1 | 1 | *Section 1.4.1* |
| **TOU Factor** | *A/C projects only* | *0* | *0* | *Section 1.4.5* |

# Section 2. Calculation Methods

Table 9 Baseline by Measure Application Type

|  |  |  |  |
| --- | --- | --- | --- |
| ****Measure Application Type**** | ****Measure Life Basis**** | ****First Baseline Period: Energy Savings Baseline**** | ****Second Baseline Period: Energy Savings Baseline**** |
| ***ER* (early retirement)** | **EUL** | Customer Average Baseline | Code Baseline |
| ***ROB* (replace-on-burnout)** | **EUL** | Code Baseline | N/A |
| ***NC* (new construction)** | **RUL/EUL-RUL** | Code Baseline | N/A |

Notes:

* For ROB measures, First Baseline is the baseline for the full EUL. There is no second baseline.
* For ER measures, First Baseline Period is the period for the RUL(remaining useful life),defined by the CPUC as RUL=1/3 EUL. Second baseline period for ER is Code baseline for the period EUL-RUL.
* Installed and purchased spray valves that qualify for this work paper may be below the flow rate of 1.15 gpm. This work paper assumes that a majority of the spray valves will be at a flow rate 1.15 gpm and estimated savings are based off this value for the measure case.

## 2.1 Electric Energy Savings Estimation Methodologies

* There were no electric energy savings associated with these measures.
* This measure is not an Early Retirement measure.

## 2.2. Demand Reduction Estimation Methodologies

* There is no anticipated demand reduction associated with this measure
* This measure is not an Early Retirement measure.

## 2.3. Gas Energy Savings Estimation Methodologies

This measure is not an Early Retirement measure.

Energy Savings Calculation

* + - 1. The annual energy use was calculated using the following equation:

*Eq-1*

Where

* + - * 1. F – flow rate (gallons/minute)
        2. density of water is 8.33 (lbm/gal)
        3. specific heat of water is 1.0 (btu/lbm-°F)
        4. temperature of mixed water (°F)
        5. temperature of supply water (°F)
        6. - daily operating hours (hours/day)
        7. - yearly days of operating (days/year)
        8. − thermal efficiency of natural gas water heating unit
      1. For calculating energy savings, the following assumptions are used:
         1. The average efficiency for the water heating unit equal to those from several evaluation studies, and is 70% [3,6]
         2. The number of annual operating days is equal to the results from previous evaluation studies of installed PRSV units in California, and is 365 days per year [3]
      2. With the above assumptions, the energy saved by installing a qualified pre-rinse spray valve is calculated as follows:

*Eqn-2*

Table 10 Calculations of Annual Energy Savings for Measure Case

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | gpm | Hours/Day | Days/yr | Mix H2O °F | Supply H20 °F | Water heater efficiency | Therms/yr | Savings Therms/yr |
| Baseline | 1.40 | 1.00 | 365 | 114.1 | 63.3 | 0.7 | 186 | - |
| Qualifying Measure 2 | 1.15 | 1.00 | 365 | 114.1 | 63.3 | 0.7 | 153 | **33** |

Water Savings Calculation

* + - 1. The annual water use was calculated using for hot, cold and mixed water temperatures, using the following equation:

*Eqn-3*

Where

* + - * 1. F – flow rate (gallons/minute)
        2. - daily operating hours (hours/day)
        3. - yearly days of operating (days/year)
        4. - annual water use (gallons/year)
      1. The water saved by installing a qualified pre-rinse spray valve is calculated as follows:

*Eqn-4*

Table 11Calculations of Annual Water Savings for Measure Case

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Water Consumption | gpm | Hour/Day | Days/yr | Gal/yr | Savings Gal/yr |
| Baseline (1.40 gpm) | 1.40 | 1.00 | 365 | 30,660 | - |
| Qualifying Measure (1.15 gpm) | 1.15 | 1.00 | 365 | 25,185 | **5,475** |

# *Section 3. Load Shapes*

Load Shapes are an important part of the life-cycle cost analysis of any energy efficiency program portfolio. The net benefits associated with a measure are based on the amount of energy saved and the avoided cost per unit of energy saved. For electricity, the avoided cost varies hourly over an entire year. Thus, the net benefits calculation for a measure requires both the total annual energy savings (kWh) of the measure and the distribution of that savings over the year. The distribution of savings over the year is represented by the measure’s load shape. The measure’s load shape indicates what fraction of annual energy savings occurs in each time period of the year. An hourly load shape indicates what fraction of annual savings occurs for each hour of the year. A Time-of-Use (TOU) load shape indicates what fraction occurs within five or six broad time-of-use periods, typically defined by a specific utility rate tariff. Formally, a load shape is a set of fractions summing to unity, one fraction for each hour or for each TOU period. Multiplying the measure load shape with the hourly avoided cost stream determines the average avoided cost per kWh for use in the life cycle cost analysis that determines a measure’s Total Resource Cost (TRC) benefit.

## 3.1 Base Case Load Shapes

The closest load shape chosen for this measure is the DEER:Indoor\_Non-CFL\_Ltg load shape. See Table 13 for a list of all Building Types and Load Shapes. See the KEMA report [31] for a more thorough discussion regarding the load shapes for this measure.

Table 12 Base Case Building Types and Load Shapes

|  |  |  |
| --- | --- | --- |
| **Building Type** | **E3 Alt. Building Type** | **Load Shape** |
| Restaurant – Fast Food | NON\_RES | DEER:Indoor\_Non-CFL\_Ltg |

The base case load shape would be expected to follow a typical nonresidential foodservice end use load shape.

Commercial PRSVs load shapes differ among food service facilities (quick service, casual dining, hotels, college, schools, hospitals etc.) hours of operation, serving periods, day-of-week, and facility location (city downtown, suburban mall, access to interstate highways, etc.). Consequently, applicable average TOU and hourly load shapes for PRSVs are unavailable. Generally, PRSVs are used to clean dishes after tables have been bussed, so loads tend to increase after regular meal periods (breakfast, lunch, and dinner).

## 3.2 Measure Load Shapes

There are no measure case load shapes applicable to these measures. The base case shapes are to be used in the cost avoidance calculation.

# Section 4. Base Case & Measure Costs

Generally, high efficiency PRSVs typically list for more than standard efficiency PRSVs. Equipment prices for these work papers were compiled from a number of sources including: Autoquotes, equipment sales reps, and manufacturer sources. Since equipment pricing in food service is closely held information and prices vary widely according to buying volume and other factors, we cannot list the sources for prices specifically.

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure Application Type** | **Measure Life Basis** | **First Baseline Period Full Measure Cost (RUL)** | **Second Baseline Period Full Measure Cost (EUL – RUL)** |
| ***NC (new construction)*** | EUL | Calculated as Incremental Measure Cost | N/A |
| ***ROB(replace on burnout)*** | EUL | Calculated as Incremental Measure Cost | N/A |
| ***ER (early retirement)*** | RUL/  EUL-RUL | Calculated as Full Gross Measure Cost | Calculated as Negative Full Gross Base Case Cost |

## 4.1 Base Case(s) Costs

The Base Case costs include only the equipment. High efficiency PRSVs require no additional labor or maintenance compared to base case PRSVs. Since this measure is applicable for ROB and NC installations, the installation and maintenance costs are expected to be the same for the customer. The estimated equipment cost is based on recent list cost data for PRSVs and applying an industry-standard 50% discount to the manufacturer published list prices. 9-11

The following Measure Application Types are appropriate to these measures. The Base Case Costs are:

Table 13 Base Case Costs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Measure Code*** | **Measure Application Type** | **Baseline** | **Equipment Cost** | **Labor / Installation Cost** | **Maintenance / Other Cost** | **Total Base Case Cost** |
| FS001 | ROB /NC | Industry Practice | $40 | $0 | $0 | $40 |

*All costs are noted as $ per measure unit*

## 4.2 Measure Case Costs

The Measure costs include only the equipment, as explained in Section 4.1. The estimated equipment cost is based on recent list cost data and applying an industry-standard 50% discount to the manufacturer published list prices (see Appendix B). 9-11

The following Measure Application Types are appropriate to these measures. The Measure Case Costs are:

Table 14 Measure Case Costs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Measure Code*** | **Measure Application Type** | **Baseline** | **Equipment Cost** | **Labor / Installation Cost** | **Maintenance / Other Cost** | **Total Measure Case Cost** |
| FS001 | ROB/ NC | Industry Practice | $89 | $N/A | $N/A | $89 |

*All costs are noted as $ per measure unit*

## 4.3 Incremental & Full Measure Costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure Application Type** | **Full Measure Cost**  **(RUL Period/First Baseline)** | **Full Measure Cost**  **(EUL-RUL Period/ Second Baseline)** | **Incremental Measure Cost** |
| ER | Measure Equipment Cost  +Measure Labor Cost | (-1)x(Base Equipment Cost  + Base Labor Cost) | Measure Equipment Cost  – Base Case Equipment Cost |
| ROB | Measure Equipment Cost  – Base Case Equipment Cost | N/A | Measure Equipment Cost  – Base Case Equipment Cost |
| NC | Measure Equipment Cost  – Base Case Equipment Cost | N/A | Measure Equipment Cost  – Base Case Equipment Cost |

# *4.3.1 Full Measure Cost*

Full Measure Cost is the cost to install an energy efficient measure per the CPUC calculators. This definition implies a different meaning depending on the Measure Application type.

\*Note: Various complicated price fluctuations are not addressed in these equations, such as future costs due to inflation in labor, future costs due to deflation in material cost, and other variables that cannot be accurately described at this time.

# *4.3.2 Incremental Measure Costs*

Incremental Measure Cost is the premium cost to install an energy efficient measure over a standard efficiency measure or code baseline measure. While IMC has a straightforward definition depending on the Measure Application type, the equation does vary.

Incremental measure costs are used in the analysis.

IMC = Measure Equipment Cost – Base Case Equipment Cost

*FS001: IMC = $98 per (unit) -- $49 per (unit) = $49 per (unit)*

# Appendix A

Equipment prices for these work papers were compiled from a number of sources including, Autoquotes, equipment sales reps and manufacturer sources. Since equipment pricing in food service is closely held information and prices vary widely according to buying volume and other factors, we cannot list the sources for prices specifically.

**Equipment Cost Data for Pre-Rinse Spray Valves**

| **Group** | **Make** | **Model** | **List Price ($)** | **Cost ($)\*** |
| --- | --- | --- | --- | --- |
| Energy Efficient | PRSV #1 | B-107-J | $197 | $99 |
| Energy Efficient | PRSV #2 | Ultraspray 2924 | $160 | $80 |
| Baseline | PRSV #3 | JF-105 | $68 | $34 |
| Baseline | PRSV #4 | PR1S | $98 | $49 |
| Baseline | PRSV #5 | CHG Encore | $80 | $40 |
| Baseline | PRSV #6 | N2180 1.6 | $76 | $38 |

\*Estimated purchase price and Incremental Measure Cost (IMC) were based on an industry-standard 50% discount off the manufacturer’s list price.

**Equipment Incremental Cost Data for Efficient Pre-Rinse Spray Valves\***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Category** | **Baseline Unit Price** | **Energy Efficient Unit Price** | **Incremental Price Difference** | **Baseline Unit Cost** | **Energy Efficient Unit Cost** | **Incremental Measure Cost (IMC)** |
| Pre-Rinse Spray Valve | $ 81 | $ 179 | $ 98 | $ 40 | $ 89 | $ 49 |

\*Estimated purchase price and Incremental Measure Cost (IMC) were based on an industry-standard 50% discount off the manufacturer’s list price

# References

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3. DEER Database for Energy-Efficient Resources, Version 2011 4.00, For Use in the California IOU 2013-14 Energy Efficiency Planning (Accessed Sep. 24, 2012 at http://www.deeresources.com /, Filename is “DEER2011\_NTGR\_2012-05-16.xls”, Row 59). [↑](#endnote-ref-3)
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5. *Pre- Rinse Spray Valves Programs: How are they Really Doing?”.* By SBW Consulting Inc., John Koeller. December 1, 2005 <http://www.allianceforwaterefficiency.org/Commercial_Food_Service_Introduction.aspx> [↑](#endnote-ref-5)
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7. Energy Policy Act 2005, Section 119 Stat 632, pp 40. [↑](#endnote-ref-7)
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10. *“Impact and Process Evaluation Final Report for California Urban Water Conservation Council 2004-5 Pre-Rinse Spray Valve Installation Program (Phase2).”* By SBW Consulting, Inc, February 21, 2007. [↑](#endnote-ref-10)