**Work Paper PGECOFST105**

**Insulated Holding Cabinet-Electric**

**Revision # 4**

**Pacific Gas & Electric Company**

**Customer Energy Solutions**

**Insulated Holding Cabinet-Electric**

**Measure Codes F110, F111**

***May 1, 2014***

# At-a-Glance Summary

|  |  |  |
| --- | --- | --- |
| **Applicable Measure Codes:** | **F110** | **F111** |
| **Measure Description:** | Insulated Holding Cabinet full size (20W/ft3) | Insulated Holding Cabinet Half size (20 W/ft3) |
| **Energy Impact Common Units:** | Per Unit/ Holding Cabinet | Per Unit/ Holding Cabinet |
| **Base Case Description:** | Source: PG&E Calculations. Existing Holding Cabinet (40W/ft3) | Source: PG&E Calculations, Existing Holding Cabinet (40W/ft3) |
| **Base Case Energy Consumption:** | Source: PG&E Calculations  5,475kWh/yr | Source: PG&E Calculations 2081 kWh/yr |
| **Measure Energy Consumption:** | Source: PG&E Calculations  1,533kWh/yr | Source: PG&E Calculations 274kWh/yr |
| **Energy Savings**  **(Base Case – Measure):** | Source: PG&E Calculations  3,942 kWh/yr | Source: PG&E Calculations 1807kWh/yr |
| **Costs Common Units:** | Holding Cabinet | Holding Cabinet |
| **Base Case Equipment Cost ($/unit):** | Source: PG&E Calculations  $3578 | Source: PG&E Calculations $2263 |
| **Measure Equipment Cost ($/unit):** | Source: PG&E Calculations  $5914 | Source: PG&E Calculations  $2644 |
| **Gross Measure Cost ($/unit)** | $5914 | $2644 |
| **Measure Incremental Cost ($/unit):** | Source: PG&E Calculations  $2336 | Source: PG&E Calculations $381 |
| **Effective Useful Life (years):** | Source: DEER2014  12 years | Source: DEER2014  12 Years |
| **Measure Application Type:** | Replace on Burnout (ROB), or New Construction (NC). | Replace on Burnout (ROB), or New Construction (NC). |
| **Net-to-Gross Ratios:** | Source: DEER2014  Com Default > 2 yrs 0.60 | Source: DEER2014  Com Default > 2 yrs 0.60 |
| **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 |
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# Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision #** | **Revision Date** | **Section-by-Section Description of Revisions** | **Author (Company)** |
| **Revision 0** | **12/11/2007** | **Original work paper: Insulated Holding Cabinet – Electric PGECOFST105 R0.doc** | **David Zabrowski (Fisher-Nickel, inc.)** |
| **Revision 1** | **6/1/09** | **Changes to EUL, NTG language and references, costs updated** | **David Zabrowski, Lauren Mills (Fisher-Nickel, inc.), Steve Blanc PG&E** |
| **Revision 2** | **2/10/2010** | **Update to DEER 2009-11 NTG file** | **David Zabrowski (Fisher-Nickel, inc.), Steve Blanc PG&E** |
| **Revision 3** | **6/8/2012**  **8/23/2012** | **Updated NTG values to DEER 2012-2013.**  **Updated base costs, measure costs and incremental costs.**  **Updated EUL and NTG language.**  **Consolidated F111 (½ size cabinets) and F112 (¾ size cabinets) into a single measure.**  **Updated descriptions for full-size and ½ size categories.**  **Adjusted calculated energy savings based on actual averages of energy consumption data from CEE database/Energy Star/CAIOUS Rebate Qualified list.**  **Updated BLD, CZ and VIN to ANY per READI requirements** | **David Zabrowski, Lauren Mills, Kong Sham (Fisher-Nickel, inc.), Charlene Spoor, PG&E**  **Charlene Spoor (PG&E)** |
| **Revision 4** | **5/1/2014** | **Updated for 7/1/14 filing, new template.** | **Charlene Spoor PG&E (CLCi)** |

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# Section 1. General Measure & Baseline Data

## Product Measure Description & Background

This work paper documents the rationale for the Insulated Holding Cabinet measure as listed in the Commercial Food Service Catalog of Pacific Gas and Electric Company’s Customer Energy Efficiency Mass Market Rebate Program. PG&E offers rebates to non-residential customers for installing qualifying lighting, refrigeration, air-conditioning, food service, and agricultural equipment

***Catalog Description –***

F110: Full-size holding cabinets are defined as any holding cabinet with an internal measured volume of greater than or equal to 15 cubic feet (≥15 ft.3). This measure does not include cook-and-hold or retherm equipment. All measures must be electric hot food holding cabinets that are fully insulated and have doors. Qualifying cabinets must not exceed the maximum idle energy rate of 20 Watts per cubic foot in accordance with the ASTM Standard F2140[[1]](#endnote-1) test method.

F111: Half-size holding cabinets are defined as any holding cabinet with an internal measured volume of less than 15 cubic feet (<15 ft.3). This measure does not include cook-and-hold or retherm equipment. All measures must be electric hot food holding cabinets that are fully insulated and have doors. Qualifying cabinets must not exceed the maximum idle energy rate of 20 Watts per cubic foot in accordance with the ASTM Standard F2140 test method.

***Program Restrictions and Guidelines.***

***Terms and Conditions:*** This measure includes new insulated holding cabinets that have a demonstrated idle energy rate of less than or equal to 20 Watts per cubic foot of internal volume, as determined by applying The ASTM Standard Test Method for the Performance of Hot Food Holding Cabinets (F2140).

The rebate for Measure Code F110 and F111 is downstream, provided to the customer at the time of installation upon receipt of application and invoice. This is not a Direct Install program.

***Market Applicability:***

This measure is applicable to any commercial cooking application, including (but not limited to) casual dining and quick service restaurants, hotels, motels, schools, colleges and recreational facilities. This measure is offered as Replace on Burnout (ROB) or New Construction (NC).

## 1.2 Product Technical Description

Commercial insulated hot food holding cabinet models that meet program requirements incorporate better insulation for reduced heat loss and may also offer additional energy saving devices such as magnetic door gaskets, auto-door closers, or Dutch doors. The insulation of the cabinet also offers better temperature uniformity within the cabinet from top to bottom. This means that qualified hot food holding cabinets are more effective at maintaining food temperature while using less energy.

Holding cabinet performance is determined by applying the ASTM Standard Test Method for the Performance of Hot Food Holding Cabinets (F2140). The ASTM standard test method is considered to be the industry standard for quantifying the efficiency and performance of hot food holding cabinets.

## 1.3 Measure Application Type

The DEER Measure Cost Data Users Guide, version 4.01[[2]](#endnote-2), defines the terms as follows:

* Early Retirement (ER) – replacing a working technology prior to failure. *Previously known as RET.*
* Replace on Burnout (ROB) – replacing a technology at the end of its useful life.
* New Construction (NC) – installing a technology in a new construction or major renovation project.

Since there are no EM&V studies on the useful life of hot holding cabinets and it is standard practice in the commercial foodservice industry to purchase equipment only when needed (e.g., replacement or additional capacity), this measure is focused only on ROB and NC applications.

The DEER Measure Cost Data Users Guide found on [www.deeresources.com](http://www.deeresources.com) under *DEER2014Database Format* hyperlink, DEER2014, spreadsheet *SPTdata\_format-V0.97.xls*, defines the terms as follows:

Table 1 Measure Application Type[[3]](#endnote-3)

*Identifies the measure application type in the Measure Implemenation table in DEER2011.*

|  |  |  |
| --- | --- | --- |
| **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* |

## 1.4 Product Base Case and Measure Case Data

The base case for both half and full size hot food holding cabinets in this work paper was the California Energy Commission (CEC) Title 20 regulations,[[4]](#endnote-4) requiring all new commercial hot food holding cabinets to have a maximum normalized idle energy rate of 40 W/ft³ based on ASTM F2140.

The measure case data was drawn from the CEC Appliance database that met the specified idle energy rate of 20W/ft³ or less. The complete list of qualifying holding cabinets is summarized in Appendix A. Table 2 summarizes the average measure holding cabinet specifications.

**Table 2. Measure ASTM test results for Hot Food Holding Cabinets.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Cabinet Size** | **Cabinet Volume (ft³)** | **Normalized Idle**  **Energy Rate (W/ft³)** | **Total Cabinet Idle Energy Rate (W)** |
| Full-Size | 25 | 11.3 | 0.28 |
| Half-Size | 10 | 5.7 | 0.05 |

## 1.4.1 DEER Base Case and Measure Case Information

The DEER2014 database for the 2014 program years does not contain information on energy use, savings, or equipment costs for an energy-efficient electric hot food holding cabinet measure. The only reference in DEER for Commercial cooking equipment is for Estimated Useful Life (EUL).

The previous version of the DEER database from 2011 and 2008 also did not contain information on energy use or savings or equipment costs for an energy-efficient electric hot food holding cabinet measure, with the exception of Estimated Useful Life.

The R0 version of this workpaper was developed with independent cost data for this measure rather than using then available 2005 DEER data. The DEER calculations used a linear savings estimate based on the average production kW of a standard and energy efficient hot food holding cabinets over a 12-hour day, 365 days per year as the bases of their savings calculations.

This Work Paper is based on the measured energy consumption rate as determined using the ASTM Standard Test Method for thePerformance of Hot Food Holding Cabinets (F2140). An example of the savings calculation as well as a summary of the savings is detailed in section 2.3 of this work paper.

This Work Paper includes newer cost data, which represents the change in Energy Efficient Holding Cabinets, as well as updated hours of operation based on field data of 15 hour per day.

**Table 3 DEER Use and Technology Table**



**Net-to-Gross Assumption:** DEER2014 does not have a specific NTG for Commercial Holding Cabinets, therefore the Commercial default for programs offered for more than 2 years is used.

The rebate for Measure Code F110 and F111 is downstream, provided to the customer at the time of installation upon receipt of application and invoice. This is not a Direct- install program.

Table 4 below summarizes all applicable DEER based Net-to-Gross ratios for programs that may be used by this measure.

Table 4 DEER Net-to-Gross Ratios

|  |  |
| --- | --- |
|  |  |
| Program Approach | NTG |
| Com Default >2yrs | 0.6 |

The NTG Ratios in Table 4 are appropriate for the measure(s) because:

* They are downloaded directly from DEER2014

**Effective Useful Life / Remaining Useful Life:**

DEER2014 database shows a EUL of 12 years for all cooking appliance measures, including electric hot holding cabinets.

**Effective Useful Life: DEER 2014**

The Effective Useful Life estimates were downloaded directly from DEER, they match the intended measures for climate zones and building types and vintages.

**Table 5 DEER Effective Useful Life**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **EUL (yrs)** | **RUL (yrs)** | **DEER Version** | **Impact IDs** |
| **ANY** | **ANY** | **ANY** | **12** | **N/A** | **DEER2014** |  |

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

**Title 20:** Under this regulation, all hot food holding cabinets manufactured after January 1, 2006 are required to be insulated and have a demonstrated idle energy rate of less than or equal to 40 Watts per cubic foot of internal volume, as determined by applying The ASTM Standard Test Method for the Performance of Hot Food Holding Cabinets (F2140).

**Title 24:** These measures do not fall under Title 24 of the California Energy Regulations.

**Federal Standards:** These measures do not fall under Federal DOE or EPA Energy Regulations.

**ASTM Standard Test Method** for thePerformance of Hot Food Holding Cabinets (F2140) is applicable for estimating holding cabinet energy use. It was used to estimate the energy consumption of the base case and measure equipment.

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

There were no specific EM&V studies identified that addressed cooking measures in the commercial sector.

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

**Energy Savings Assumption (ΔW):***:*

* The base case used for calculating both the existing units energy use and above code energy savings was the California Energy Commission (CEC) Title 20 regulations for hot food holding cabinets.
* The energy savings calculations listed in Tables 6-7 use Title 20 as the baseline for potential energy savings requiring all hot food holding cabinets sold in California to meet a normalized idle energy rate of 40 Watts/ft³.

**Table 6 Insulated Hot Food Holding Cabinet Cost Effectiveness Example—Full Size Holding Cabinets**

|  |  |  |
| --- | --- | --- |
| **Performance** | **Baseline** | **Qualifying Model** |
| Operating Energy Rate | 1.00 kW | 0.28 kW |
| Annual Energy Use | 5,475 kWh | 1,533 kWh |
| Annual Energy Costa | $712 | $199 |
| Estimated Demand Reduction | - | 0.72 kW |
| Annual Energy Savings | - | 3,942 kWh |
| Annual Energy Cost Savings | - | $513 |
| Incremental Measure Cost | - | SEE APPENDIX B |
| Estimated Useful Life (EUL)**a** | 12 | 12 |

|  |  |  |
| --- | --- | --- |
| **Performance** | **Baseline** | **Qualifying Model** |
| Operating Energy Rate | 0.38 kW | 0.05 kW |
| Annual Energy Use | 2,081 kWh | 274 kWh |
| Annual Energy Costa | $271 | $38 |
| Estimated Demand Reduction | - | 0.33 kW |
| Annual Energy Savings | - | 1,807 kWh |
| Annual Energy Cost Savings | - | $235 |
| Incremental Measure Costa | - | SEE APPENDIX B |
| Estimated Useful Life (EUL)**b** | 12 | 12 |

**Table 7 Insulated Hot Food Holding Cabinet Cost Effectiveness Example—Half Size Holding Cabinets**

a Incremental measure cost was determined through comparison of an average of published pricing listed in APPENDIX B.

b The estimated useful life is based on 2014 DEER EUL estimates.

**Table 8 Measure ASTM test results for Hot Food Holding Cabinets.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Cabinet Size** | **Cabinet Volume (ft³)** | **Normalized Idle**  **Energy Rate (W/ft³)** | **Total Cabinet Idle Energy Rate (W)** |
| Full-Size | 25 | 11.3 | 0.28 |
| Half-Size | 10 | 5.7 | 0.05 |

**Hours of Operation**:

* Energy usage calculations are based on 15 hours a day, 365 days per year operation at a typical temperature setting of 150°F.
* Note that the different sizes for the holding cabinets (half size and full size) have proportional operating energy rates.
* Operating energy rate for the full size holding cabinets was obtained in accordance with the ASTM Standard F2140. Electrical energy cost is estimated at $0.13 per kWh.

**Table 9 Hours of Operation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Hours of Operation hrs/yr** | **Reference** |
| **ANY** | **ANY** | **ANY** | **5475** | **Industry Std** |

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

**Table 10 Base Case and Measure Case Costs Summary**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Costs ($)** | | |  |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Base Case** | **Measure Case** | **IMC** | **Reference** |
| **ANY** | **ANY** | **ANY** | **$3578** | **$5914** | **$2336** | **F110** |
| **ANY** | **ANY** | **ANY** | **$2263** | **$2644** | **$381** | **F111** |

**Effective Useful Life:**

* The 2014 DEER database shows a EUL of 12 years for all cooking appliance measures, including electric hot holding cabinets.[[5]](#endnote-5)

**Net-to-Gross Assumption:**

* The NTG’s were taken directly from DEER2014.

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

* It is industry practice to only replace a piece of equipment when it no longer is working due to the high cost of equipment, therefore the ISR is considered to be 1.

***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.

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

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

**Table 11 Summary of Inputs**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Input Variable** | **Variations** | **F110 Base Case 1 Average Value** | **F111 Base Case 1 Average Value** | **Base Case 2 Average Value** | **F110 Measure Case Average Value** | **F111 Measure Case Average Value** | **Reference Section** |
| **Electric Savings** | None | 5475kWh | *2081kWh* | *N/A* | *1533kWh* | *274kWh* | *Section 2.1* |
| **Gas Savings** | None | N/A | N/A | N/A | N/A | N/A | Section 2.3 |
| **Hours of operation** | None | 5475 | 5475 | N/A | 5475 | 5475 | Section 1.4.4 |
| **Full Cost** | ROB, NC | $3578 | $2263 | N/A | $5914 | $2644 | Section 1.4.4 |
| **Incremental Cost** | ROB, NC | 0 | 0 | N/A | $2336 | $381 | Section 1.4.4 |
| **EUL /RUL** | ROB, NC | 12 | 12 | N/A | 12 | 12 | Section 1.4.4 |
| **NTG** | One | 0.6 | 0.6 | N/A | 0.6 | 0.6 | Section 1.4.4 |
| **ISR** | No | 1 | 1 | N/A | 1 | 1 | Section 1.4.4 |
| **TOU Factor** | *A/C projects only* | *N/A* | *N/A* | *N/A* | *N/A* | *N/A* | *Section 1.4.5* |

# Section 2. Calculation Methods

Table 12 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.

## 2.1 Electric Energy Savings Estimation Methodologies

Energy usage calculations are based on 15 hours a day, 365 days per year operation at a typical temperature setting of 150°F. Note that the different sizes for the holding cabinets (half size and full size) have proportional operating energy rates. Operating energy rate for the full size holding cabinets was obtained in accordance with the ASTM Standard F2140. Electrical energy cost is estimated at $0.13 per kWh.

The energy savings calculations listed in Tables 6-7 on page 5 of this document, use Title 20 as the baseline for potential energy savings requiring all hot food holding cabinets sold in California to meet a normalized idle energy rate of 40 Watts/ft³.

## 2.2. Demand Reduction Estimation Methodologies

The demand reduction estimation is based on measured data for standard efficiency insulated holding cabinets and for high-efficiency insulated holding cabinets. The measured data are derived from tests conducted under ASTM Standard Test Method for thePerformance of Hot Food Holding Cabinets (F2140).

ASTM F2140 provides standard conditions under which holding cabinet energy use is measured. The estimated demand reduction of 720 Watts for a full-size holding cabinet and 330 Watts for a half-size holding cabinet is based on data from tests of standard efficiency and high-efficiency insulated holding cabinets. Applying a Coincidence Factor of 0.9 per the DEER methodology[[6]](#endnote-6)  yields a Demand Savings of 650 Watts for a full-size hot food holding cabinet and 300 Watts for a half-size hot food holding cabinet.

## 2.3. Gas Energy Savings Estimation Methodologies

There are no gas energy savings associated with this measure.

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

Commercial holding cabinet load shapes differ among food service facilities (quick service, casual dining, hotels, college, schools, hospitals etc) depending on daily menu variations, 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 holding cabinets are unavailable. The ASTM Standard Test Method used to generate energy use data for evaluation against the Energy Star program is based on hours of use and operating condition (preheat, idle). Generally, holding cabinets are operated all day long and are used to stage prepared hot food before it is served, so loads tend to increase shortly before and during regular meal periods (breakfast, lunch, and dinner). Between meal periods holding cabinet use tends to be idle.

Table 13 Base Case Building Types and Load Shapes

|  |  |  |
| --- | --- | --- |
| **Building Type** | **E3 Alt. Building Type** | **Load Shape** |
| Restaurant – Fast Food | NON\_RES | DEER:Non Res Food Service |

## 3.2 Measure Load Shapes

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

Commercial holding cabinet load shapes differ among food service facilities (quick service, casual dining, hotels, college, schools, hospitals etc) depending on daily menu variations, 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 holding cabinets are unavailable. The ASTM Standard Test Method used to generate energy use data for evaluation against the Energy Star program is based on hours of use and operating condition (preheat, idle). Generally, holding cabinets are operated all day long and are used to stage prepared hot food before it is served, so loads tend to increase shortly before and during regular meal periods (breakfast, lunch, and dinner). Between meal periods holding cabinet use tends to be idle.

Table 14 Measure Case Building Types and Load Shapes

|  |  |  |
| --- | --- | --- |
| **Building Type** | **E3 Alt. Building Type** | **Load Shape** |
| Restaurant – Fast Food | NON\_RES | DEER:Non Res Food Service |

# Section 4. Base Case & Measure Costs

High-efficiency insulated holding cabinets typically have a higher list price than standard efficiency insulated holding cabinets. Models that meet this requirement incorporate better insulation, reducing heat loss, and may also offer additional energy saving devices such as magnetic door gaskets, auto-door closures, or Dutch doors, that increase their cost-effectiveness. The insulation of the cabinet also offers better temperature uniformity within the cabinet from top to bottom.

**Table 15 Base Case and Measure Case by Measure Application Type**

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

**Table 16 Base Case Costs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Measure Code*** | **Measure Application Type** | **Baseline** | **Equipment Cost** | **Labor / Installation Cost** | **Maintenance / Other Cost** | **Total Base Case Cost** |
| F110 | ROB/NC | CEC Requirement | $3578 | $N/A | $N/A | $3578 |
| F111 | ROB/NC | CEE Requirement | $2263 | $N/A | $N/A | $2263 |

*All costs are noted as $ per measure unit*

The Base Case costs include only the equipment. High-efficiency holding cabinets require no additional labor or maintenance compared to base case holding cabinets. 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 electric holding cabinets and applying an industry-standard 50% discount to the manufacturer published list prices. 9

Equipment prices for these work papers were compiled from a number of sources including, Autoquotes, equipment sales reps and manufacturer sources[[7]](#endnote-7). 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.

## 4.2 Measure Case Costs

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

**Table 17 Measure Case Costs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Measure Code*** | **Measure Application Type** | **Baseline** | **Equipment Cost** | **Labor / Installation Cost** | **Maintenance / Other Cost** | **Total Measure Case Cost** |
| F110 | ROB/NC | CEC Requirement | $5914 | $N/A | $N/A | $2336 |
| *F111* | ROB/NC | *CEC Requirement* | *$2644* | *$N/A* | *$N/A* | *$381* |

*All costs are noted as $ per measure unit*

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).

See Appendix B for actual list pricing of equipment.

## 4.3 Incremental & Full Measure Costs

**Table 18 Incremental and Full Measure Costs by Measure Application Type**

|  |  |  |  |
| --- | --- | --- | --- |
| **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.

This Measure Application Type(s) is (are): **NC** or **ROB**, so the Full Measure Cost (FMC) is represented by the equation below (choose):

We assume that, unless stated otherwise, the measure case labor and base case labor are assumed to be the same value reducing the equation to the following:

FMC = Measure Equipment Cost – Base Case Equipment *Cost*

*F110 FMC = $5914 per (unit) -- $ 3578 per (unit) = $ 2336 per (unit)*

*F111 FMC = $2644 per (unit) -- $ 2263 per (unit) = $ 381 per (unit)*

\*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 costs are used in this analysis.

This Measure Application Types is: **ROB or NC** so the Gross Measure Cost (GMC) is represented by the appropriate equation below:

IMC = Measure Equipment Cost – Base Case Equipment Cost

*F110 IMC = $5914 per (unit) -- $ 3578 per (unit) = $ 2336 per (unit)*

*F111 IMC = $2644 per (unit) -- $ 2263 per (unit) = $ 381 per (unit)*

**Table 19 Equipment Incremental Cost Data for Energy Efficient Hot Food Holding Cabinets\***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Category** | **Baseline Unit Price** | **Energy Efficient Unit Price** | **Incremental Price Difference** | **Baseline Unit Cost** | **Energy Efficient Unit Cost** | **Incremental Measure Cost (IMC)** |
| F110 Full-Size  Hot Food Holding Cabinet | $7,156 | $11,828 | $4,673 | $3,578 | $5,914 | $2,336 |
| F111 Half-Size  Hot Food Holding Cabinet | $4,527 | $5,289 | $762 | $2,263 | $2,644 | $381 |

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

**Appendix A**

**ASTM Qualifying Equipment Data for Hot Food Holding Cabinets**

| **Brand Name** | **Model Number** | **Measured Interior Volume Cu Ft** | **Idle Energy Consumption Rate Watts** | **Calculated Watts/CuFt** |
| --- | --- | --- | --- | --- |
| Alto-Shaam | 1000-BQ2/128 | 28.15 | 379 | 13.46 |
| Alto-Shaam | 1000-BQ2/192 | 43.98 | 523 | 11.89 |
| Alto-Shaam | 1000-BQ2/96 | 21.99 | 331 | 15.05 |
| Alto-Shaam | 1000-UP\*\* | 15.56 | 284 | 18.25 |
| Alto-Shaam | 12.20\*W | 19.41 | 212 | 10.92 |
| Alto-Shaam | 1200-S\*\*\* | 9.85 | 197 | 20 |
| Alto-Shaam | 1200-UP\*\*\* | 19.7 | 381 | 19.34 |
| Alto-Shaam | 20-20\*W | 29.27 | 291 | 9.94 |
| Cambro Manufacturing Co. | CMBH1826\*\*\* | 18 | 12 | 0.67 |
| Cambro Manufacturing Co. | CMBH1826L | 8 | 10 | 1.25 |
| Cambro Manufacturing Co. | CMBH1826LC | 8 | 10 | 1.25 |
| Cambro Manufacturing Co. | CMBH1826LF | 8 | 10 | 1.25 |
| Cambro Manufacturing Co. | CMBH1826LTR | 8 | 10 | 1.25 |
| Cambro Manufacturing Co. | UPCH1600 | 7.76 | 15 | 1.93 |
| Cambro Manufacturing Co. | UPCH400 | 3.88 | 15 | 3.87 |
| Cambro Manufacturing Co. | UPCH800 | 7.76 | 15 | 1.93 |
| Cambro Manufacturing Co. | UPCHT800 | 7.76 | 15 | 1.93 |
| Cambro Manufacturing Co. | UPCHW400 | 3.88 | 15 | 3.87 |
| Carter-Hoffman, LLC | BB1824 [120V] | 10.5 | 114 | 10.86 |
| Carter-Hoffman, LLC | BB1824 [240V] | 10.5 | 117 | 11.14 |
| Carter-Hoffman, LLC | BB1824 [280V] | 10.5 | 119 | 11.33 |
| Carter-Hoffman, LLC | BB96 | 27.8 | 507 | 18.24 |
| Carter-Hoffman, LLC | PH181 [120V] | 10.5 | 114 | 10.86 |
| Carter-Hoffman, LLC | PH181 [240V] | 10.5 | 102 | 9.71 |
| Carter-Hoffman, LLC | PH181 [280V] | 10.5 | 101 | 9.62 |
| Crescor | CCB120A\*\*\*\*\* | 38.1 | 432 | 11.34 |
| Crescor | CCB150\*\*\*\* | 41.32 | 632 | 15.3 |
| Crescor | EB150\*\*\*\* | 40.6 | 615 | 15.15 |
| Crescor | H137\*UA12C\*\*208\*\*\* | 22.53 | 280 | 12.43 |
| Crescor | H137\*UA12C\*\*240\*\*\* | 22.53 | 280 | 12.43 |
| Crescor | H137\*UA12C\*\*2K\*\*\*\* | 22.53 | 280 | 12.43 |
| Crescor | H137\*UA9C\*\*\*\*\*\*\*\* | 16.4 | 246 | 15 |
| Crescor | H137WSUA12C\*\*\*\*\*\*\*\*\* | 22.53 | 280 | 12.43 |
| Crescor | H137WSUA6CM\*\*\*\*\*\*\*\*\* | 10.87 | 193 | 17.76 |
| Crescor | H138\*1834C\*\*208\*\*\* | 22.53 | 280 | 12.43 |
| Crescor | H138\*1834C\*\*240\*\*\* | 22.53 | 280 | 12.43 |
| Crescor | H138\*1834C\*\*2K\*\*\*\* | 22.53 | 280 | 12.43 |
| Crescor | H138WS1816CM\*\*\*\*\*\*\*\*\* | 10.87 | 193 | 17.76 |
| Crescor | H138WS1834C\*\*\*\*\*\*\*\*\* | 22.53 | 280 | 12.43 |
| Crescor | H161FUA11CM\*\*\* | 22.85 | 447 | 19.56 |
| Crescor | H339\*\*\*12188C\*\*\*\*\*\* | 7.12 | 122 | 17.13 |
| Crescor | H339\*\*\*1813C\*\*\*\*\* | 7.14 | 122 | 17.09 |
| Crescor | H339\*\*\*188C\*\*\*\*\*\* | 7.14 | 122 | 17.09 |
| Crescor | H339WSSUA8D\*\*\* | 8.29 | 140 | 16.89 |
| FWE | E-600 | 16.5 | 33 | 2 |
| FWE | E-600-\*\*\* | 16.5 | 33 | 2 |
| FWE | E-720 | 23.2 | 36 | 1.55 |
| FWE | E-720-\*\*\* | 23.2 | 36 | 1.55 |
| FWE | E-720-XL | 29 | 13 | 0.45 |
| FWE | E-720-XL-\*\*\* | 29 | 13 | 0.45 |
| FWE | E-960 | 31.1 | 31 | 1 |
| FWE | E-960-\*\*\* | 31.1 | 31 | 1 |
| FWE | HLC-5 (120v, 500W) | 3 | 16 | 5.33 |
| FWE | HLC-5-\*\*\* (120v, 500W) | 3 | 16 | 5.33 |
| FWE | HLC-5S (120v, 500W) | 3 | 16 | 5.33 |
| FWE | HLC-5S-\*\*\* (120v, 500W) | 3 | 16 | 5.33 |
| FWE | HLC-SL-1826-5 (120v, 1000W) | 7 | 18 | 2.57 |
| FWE | HLC-SL-1826-5-\*\*\* (120v, 500W) | 7 | 18 | 2.57 |
| FWE | HLC-SL-1826-8 (120v, 1000W) | 8.9 | 15 | 1.69 |
| FWE | HLC-SL-1826-8-\*\*\* (120v, 1000W) | 8.9 | 15 | 1.69 |
| FWE | MTU-12 | 23 | 16 | 0.7 |
| FWE | MTU-12-\*\*\* | 23 | 16 | 0.7 |
| FWE | MTU-4 | 9.1 | 36 | 3.96 |
| FWE | MTU-4-\*\*\* | 9.1 | 36 | 3.96 |
| FWE | P-60 | 14.3 | 26 | 1.82 |
| FWE | P-60-\*\*\* | 14.3 | 26 | 1.82 |
| FWE | PHTT-10\*\*\*\* | 17.9 | 27 | 1.51 |
| FWE | PHTT-12\*\*\*\*\* | 23.1 | 22 | 0.95 |
| FWE | PHTT-12\*\*\*\*\*\* | 23.1 | 23 | 1 |
| FWE | PHTT-4 | 8.3 | 33 | 3.98 |
| FWE | PHTT-4-\*\*\* | 8.3 | 33 | 3.98 |
| FWE | PHTT-4S | 8.3 | 33 | 3.98 |
| FWE | PHTT-4S-\*\*\* | 8.3 | 33 | 3.98 |
| FWE | PHTT-6 | 12.3 | 28 | 2.28 |
| FWE | PHTT-6\*\*\*\*\* | 12.3 | 33 | 2.68 |
| FWE | PHTT-6\*\*\*\*\*\* | 12.3 | 36 | 2.93 |
| FWE | PHTT-6-\*\*\* | 12.3 | 28 | 2.28 |
| FWE | PHTT-6S | 12.3 | 28 | 2.28 |
| FWE | PHTT-6S-\*\*\* | 12.3 | 28 | 2.28 |
| FWE | PHU-4 | 9.1 | 36 | 3.96 |
| FWE | PHU-4-\*\*\* | 9.1 | 36 | 3.96 |
| FWE | PST-10 | 6.6 | 24 | 3.64 |
| FWE | PST-10-\*\*\* | 6.6 | 24 | 3.64 |
| FWE | TS-1633-36 | 23.5 | 20 | 0.85 |
| FWE | TS-1633-36-\*\*\* | 23.5 | 20 | 0.85 |
| FWE | UHS-10 | 19.2 | 15 | 0.78 |
| FWE | UHS-10-\*\*\* | 19.2 | 15 | 0.78 |
| FWE | UHS-12 | 22.5 | 14 | 0.62 |
| FWE | UHS-12-\*\*\* | 22.5 | 14 | 0.62 |
| FWE | UHS-4 | 9 | 30 | 3.33 |
| FWE | UHS-4-\*\*\* | 9 | 30 | 3.33 |
| FWE | UHST-13 | 24.5 | 20 | 0.82 |
| FWE | UHST-13-\*\*\* | 24.5 | 20 | 0.82 |
| Metro | C567-NFC-\*\* | 19.2 | 348 | 18.13 |
| Metro | C567-NFS-\*\* | 19.2 | 348 | 18.13 |
| Metro | C567-SFC-\*\* | 19.2 | 348 | 18.13 |
| Metro | C567-SFS-\*\* | 19.2 | 348 | 18.13 |
| Metro | C567L-NFC-\*\* | 19.2 | 348 | 18.13 |
| Metro | C567L-NFS-\*\* | 19.2 | 348 | 18.13 |
| Metro | C567L-SFC-\*\* | 19.2 | 348 | 18.13 |
| Metro | C567L-SFS-\*\* | 19.2 | 348 | 18.13 |
| Metro | C569-SDC-\*\* | 24 | 418 | 17.42 |
| Metro | C569-SDS-\*\* | 24 | 371 | 15.46 |
| Metro | C569-SFC-\*\* | 24 | 418 | 17.42 |
| Metro | C569-SFS-\*\* | 24 | 371 | 15.46 |
| Metro | C569L-SDC-\*\* | 24 | 356 | 14.83 |
| Metro | C569L-SDS-\*\* | 24 | 356 | 14.83 |
| Metro | C569L-SFC-\*\* | 24 | 356 | 14.83 |
| Metro | C569L-SFS-\*\* | 24 | 356 | 14.83 |
| Metro | C587-SF\*-\*\*\*\*\* | 20.3 | 401 | 19.75 |
| Metro | C587-SFC-\*\* | 19.2 | 292 | 15.21 |
| Metro | C587-SFS-\*\* | 19.2 | 270 | 14.06 |
| Metro | C587L-SF\*-\*\*\*\*\* | 20.3 | 401 | 19.75 |
| Metro | C587L-SFC-\*\* | 19.2 | 292 | 15.21 |
| Metro | C587L-SFS-\*\* | 19.2 | 270 | 14.06 |
| Metro | C589-SDC-\*\* | 24 | 440 | 18.33 |
| Metro | C589-SDS-\*\* | 24 | 388 | 16.17 |
| Metro | C589-SFC-\*\* | 24 | 440 | 18.33 |
| Metro | C589-SFS-\*\* | 24 | 388 | 16.17 |
| Metro | C589L-SDC-\*\* | 24 | 440 | 18.33 |
| Metro | C589L-SDS-\*\* | 24 | 388 | 16.17 |
| Metro | C589L-SFC-\*\* | 24 | 440 | 18.33 |
| Metro | C589L-SFS-\*\* | 24 | 388 | 16.17 |
| Metro | C597-SF\*-\*\*\*\*\* | 20.3 | 401 | 19.75 |
| Metro | C597-SFC-\*\* | 19.2 | 292 | 15.21 |
| Metro | C597-SFS-\*\* | 19.2 | 270 | 14.06 |
| Metro | C597L-SF\*-\*\*\*\*\* | 20.3 | 401 | 19.75 |
| Metro | C597L-SFC-\*\* | 19.2 | 292 | 15.21 |
| Metro | C597L-SFS-\*\* | 19.2 | 270 | 14.06 |
| Metro | C599-SDC-\*\* | 24 | 455 | 18.96 |
| Metro | C599-SDS-\*\* | 24 | 436 | 18.17 |
| Metro | C599-SFC-\*\* | 24 | 455 | 18.96 |
| Metro | C599-SFS-\*\* | 24 | 436 | 18.17 |
| Metro | C599L-SDC-\*\* | 24 | 455 | 18.96 |
| Metro | C599L-SDS-\*\* | 24 | 436 | 18.17 |
| Metro | C599L-SFC-\*\* | 24 | 455 | 18.96 |
| Metro | C599L-SFS-\*\* | 24 | 436 | 18.17 |
| Metro | MBQ-120 | 29.8 | 523 | 17.55 |
| Metro | MBQ-120-QH | 29.8 | 523 | 17.55 |
| Metro | MBQ-120D | 37.2 | 520 | 13.98 |
| Metro | MBQ-120D-QH | 37.2 | 520 | 13.98 |
| Metro | MBQ-144 | 35.2 | 549 | 15.6 |
| Metro | MBQ-144-QH | 35.2 | 549 | 15.6 |
| Metro | MBQ-150D | 44.7 | 654 | 14.63 |
| Metro | MBQ-150D-QH | 44.7 | 654 | 14.63 |
| Metro | MBQ-180 | 44 | 550 | 12.5 |
| Metro | MBQ-180-QH | 44 | 550 | 12.5 |
| Metro | MBQ-180D | 52.7 | 771 | 14.63 |
| Metro | MBQ-180D-QH | 52.7 | 771 | 14.63 |
| Metro | MBQ-200D | 57.6 | 793 | 13.77 |
| Metro | MBQ-200D-QH | 57.6 | 793 | 13.77 |
| Metro | MBQT-180D | 52.7 | 804 | 15.26 |
| Metro | MBQT-180D-\*\*\*\*\*\*\* | 52.7 | 804 | 15.26 |
| Metro | MBQT-180D-QH | 52.7 | 804 | 15.26 |
| Vulcan | VBP13\*\*\*\*\*\*\*\*\*\*\* | 17.14 | 17 | 0.99 |
| Vulcan | VBP15\*\*\*\*\*\*\*\*\*\*\* | 19.14 | 16 | 0.84 |
| Vulcan | VBP5\*\*\*\*\*\*\*\*\*\*\* | 7.11 | 24 | 3.38 |
| Vulcan | VBP7\*\*\*\*\*\*\*\*\*\*\* | 9.48 | 18 | 1.9 |
| Vulcan | VBP77\*\*\*\*\*\*\*\*\*\*\* | 18.96 | 17 | 0.9 |
| Vulcan | VHFA18\*\*\*\*\*\*\*\*\*\*\* | 22.5 | 32 | 1.42 |
| Vulcan | VHFA9\*\*\*\*\*\*\*\*\*\*\* | 12.73 | 34 | 2.67 |
| Vulcan | VHP15\*\*\*\*\*\*\*\*\*\*\* | 8.77 | 24 | 2.74 |
| Vulcan | VHP7\*\*\*\*\*\*\*\*\*\*\* | 4.12 | 36 | 8.74 |
| Vulcan | VP18\*\*\*\*\*\*\*\*\*\*\* | 22.2 | 29 | 1.31 |
| Wittco | 1220-15\*\*\*\*\*\*\*\*\*\*\* | 8.77 | 24 | 2.74 |
| Wittco | 1220-7\*\*\*\*\*\*\*\*\*\*\* | 4.12 | 36 | 8.74 |
| Wittco | 1826-13\*\*\*\*\*\*\*\*\*\*\* | 17.14 | 17 | 0.99 |
| Wittco | 1826-15\*\*\*\*\*\*\*\*\*\*\* | 19.14 | 16 | 0.84 |
| Wittco | 1826-5\*\*\*\*\*\*\*\*\*\*\* | 7.11 | 24 | 3.38 |
| Wittco | 1826-7\*\*\*\*\*\*\*\*\*\*\* | 9.48 | 18 | 1.9 |
| Wittco | 1826-77\*\*\*\*\*\*\*\*\*\*\* | 18.96 | 17 | 0.9 |
| McCall | 1-1020H\*\*\*\* | 22.4 | 280 | 12.5 |
| McCall | 1-1045H\*\*\*\* | 49 | 230 | 4.69 |
| McCall | 2-2020H\*\*\*\* | 22.4 | 280 | 12.5 |
| McCall | 2-2045H\*\*\*\* | 49 | 230 | 4.69 |
| McCall | 4-4020H\*\*\*\* | 22.4 | 280 | 12.5 |
| McCall | 4-4020H01\*\*\* | 22.4 | 280 | 12.5 |
| McCall | 4-4020HP\*\*\* | 22.4 | 280 | 12.5 |
| McCall | 4-4020HP01\*\* | 22.4 | 280 | 12.5 |
| McCall | 4-4045H\*\*\*\* | 49 | 230 | 4.69 |
| McCall | 4-4045H01\*\*\* | 49 | 230 | 4.69 |
| McCall | 4-4045HP\*\*\* | 49 | 230 | 4.69 |
| McCall | 4-4045HP01\*\* | 49 | 230 | 4.69 |
| Norlake | NW211\*\*\*/0 | 18.3 | 25 | 1.37 |
| Norlake | PW252\*\*\*/0 | 19 | 39 | 2.05 |
| Norlake | PW253\*\*\*/0 | 19 | 39 | 2.05 |
| Norlake | PW254\*\*\*/0 | 19 | 39 | 2.05 |
| Norlake | PW554\*\*\*/8 | 37 | 29 | 0.78 |
| Winston Industries | HA4522-GE | 21.5 | 412 | 19.16 |
| Winston Industries | HL4022-GE | 22.11 | 436 | 19.72 |

**Appendix B**

**Equipment Cost Data for Full-Size Hot Food Holding Cabinets**

| **Group** | **Make** | **Model** | **List Price ($)** | **Cost($)\*** |
| --- | --- | --- | --- | --- |
| Baseline | Bevles | HCSS74W12 | $7,899 | $3,950 |
| Baseline | Carter-Hoffmann | BB700 | $9,232 | $4,616 |
| Baseline | Carter-Hoffmann | HBU14 (Glass and Steel Doors) | $4,016 | $2,008 |
| Baseline | Carter-Hoffmann | HBU18 (Dutch Doors) | $4,228 | $2,114 |
| Baseline | Carter-Hoffmann | HWP36 | $8,710 | $4,355 |
| Baseline | Carter-Hoffmann | HWU18 (Dutch Doors) | $4,930 | $2,465 |
| Baseline | Cres Cor | H137PWSUA12C | $9,940 | $4,970 |
| Baseline | Delfield | SSH2-S | $13,805 | $6,903 |
| Baseline | Delfield | SSHRT1-S | $13,711 | $6,856 |
| Baseline | Eagle Group | HCFNSSI-RA2.25-120 | $6,385 | $3,193 |
| Baseline | Eagle Group | HPFNSSI-RA2.25-120 | $6,438 | $3,219 |
| Baseline | Eagle Group | PCFNSSI-RA2.25-120 | $6,415 | $3,208 |
| Baseline | FWE | E-600 | $7,644 | $3,822 |
| Baseline | FWE | E-720 | $7,816 | $3,908 |
| Baseline | FWE | E-960 | $8,784 | $4,392 |
| Baseline | FWE | UHST-13 | $6,616 | $3,308 |
| Baseline | Hatco | FSHC-12W2 | $6,753 | $3,377 |
| Baseline | Hatco | FSHC-17W-1 | $6,066 | $3,033 |
| Baseline | Henny Penny | HHC-900 | $7,810 | $3,905 |
| Baseline | Henny Penny | HHC-980 | $9,508 | $4,754 |
| Baseline | Metro | C519-CFC-4 | $3,466 | $1,733 |
| Baseline | Metro | C537-CFC-4 | $4,248 | $2,124 |
| Baseline | Metro | C539-CFC-4 | $4,472 | $2,236 |
| Baseline | Metro | C569L-NDC-U | $6,652 | $3,326 |
| Baseline | Metro | C569-NFC-UPFC | $7,649 | $3,825 |
| Baseline | Metro | C599-NDC-U | $8,323 | $4,162 |
| Baseline | Metro | C5Z65-\*\*\*-\*\*\*\*\* | $4,967 | $2,484 |
| Baseline | Metro | MBQ-72 | $5,819 | $2,910 |
| Baseline | Metro | MBQ-90 | $6,009 | $3,005 |
| Baseline | Metro | MBQT-150D-QH | $10,556 | $5,278 |
| Baseline | Nor-Lake | NW211\*\*\*/0 | $5,260 | $2,630 |
| Baseline | Nor-Lake | PW252\*\*\*/0 | $6,231 | $3,116 |
| Baseline | Nor-Lake | PW253\*\*\*/0 | $7,169 | $3,585 |
| Baseline | Nor-Lake | PW554\*\*\*/8 | $10,664 | $5,332 |
| Baseline | Royalton | RHHC-2000-C4 | $5,649 | $2,825 |
| Baseline | Vulcan | VHFA-18 | $3,760 | $1,880 |
| Energy Efficient | Alto-Shaam | 1000-BQ2/128 | $6,285 | $3,143 |
| Energy Efficient | Alto-Shaam | 1000-BQ2/96 | $4,925 | $2,463 |
| Energy Efficient | Alto-Shaam | 1000-UP | $4,526 | $2,263 |
| Energy Efficient | Alto-Shaam | 12.20MW | $8,449 | $4,225 |
| Energy Efficient | Alto-Shaam | 1200-UP | $5,128 | $2,564 |
| Energy Efficient | Alto-Shaam | 20.20MW | $12,408 | $6,204 |
| Energy Efficient | Cambro | CMBH1826TSF | $8,840 | $4,420 |
| Energy Efficient | Carter-Hoffmann | BR96 | $13,126 | $6,563 |
| Energy Efficient | Cleveland Range LLC | HCWH-20.20 | $16,990 | $8,495 |
| Energy Efficient | Cres Cor | CCB-120A | $12,792 | $6,396 |
| Energy Efficient | Cres Cor | CCB-150 | $13,652 | $6,826 |
| Energy Efficient | Cres Cor | EB-150 | $8,152 | $4,076 |
| Energy Efficient | Cres Cor | H137S96BC | $8,076 | $4,038 |
| Energy Efficient | Cres Cor | H137UA12C\*\*2K | $6,144 | $3,072 |
| Energy Efficient | Cres Cor | H137UA9C | $5,632 | $2,816 |
| Energy Efficient | Cres Cor | H137WSUA12C | $8,800 | $4,400 |
| Energy Efficient | Cres Cor | H161FUA11CM | $12,032 | $6,016 |
| Energy Efficient | Cres Cor | EB150\*\*\*\* | $8,152 | $4,076 |
| Energy Efficient | Winston Industries | HL4022-AL | $5,893 | $2,947 |
| Energy Efficient | Winston Industries | HL4522-AL | $6,407 | $3,204 |
| Energy Efficient | FWE | E-720-XL | $8,400 | $4,200 |
| Energy Efficient | FWE | MTU-12 | $6,738 | $3,369 |
| Energy Efficient | Metro | C569-SDC-U | $7,545 | $3,773 |
| Energy Efficient | Metro | C599-SDS-U | $8,364 | $4,182 |
| Energy Efficient | Metro | MBQ-120 | $6,288 | $3,144 |
| Energy Efficient | Metro | MBQ-120D | $7,157 | $3,579 |
| Energy Efficient | Metro | MBQ-144 | $7,208 | $3,604 |
| Energy Efficient | Metro | MBQ-150D | $8,076 | $4,038 |
| Energy Efficient | Metro | MBQ-180 | $7,782 | $3,891 |
| Energy Efficient | Metro | MBQ-180D | $8,648 | $4,324 |
| Energy Efficient | Metro | MBQ-200D | $9,190 | $4,595 |
| Energy Efficient | Metro | MBQT-180D-QH | $10,989 | $5,495 |
| Energy Efficient | Traulsen | AHF132W-FHS | $9,151 | $4,576 |
| Energy Efficient | Traulsen | AHF132WP-FHS | $11,015 | $5,508 |
| Energy Efficient | Traulsen | AHF232W-FHS | $13,317 | $6,659 |
| Energy Efficient | Traulsen | AHF232W-HHS | $13,741 | $6,871 |
| Energy Efficient | Traulsen | AHF232WP-FHS | $16,365 | $8,183 |
| Energy Efficient | Traulsen | AHF332W-FHS | $18,973 | $9,487 |
| Energy Efficient | Traulsen | AHF332WP-FHS | $23,695 | $11,848 |
| Energy Efficient | Traulsen | AIH132L-FHS | $11,068 | $5,534 |
| Energy Efficient | Traulsen | AIH232L-FHS | $15,238 | $7,619 |
| Energy Efficient | Traulsen | AIH332L-FHS | $20,307 | $10,154 |
| Energy Efficient | Traulsen | G14300 | $7,293 | $3,647 |
| Energy Efficient | Traulsen | G14302P | $9,996 | $4,998 |
| Energy Efficient | Traulsen | G14310 | $6,962 | $3,481 |
| Energy Efficient | Traulsen | G14312P | $9,359 | $4,680 |
| Energy Efficient | Traulsen | G24300 | $10,149 | $5,075 |
| Energy Efficient | Traulsen | G24304P | $14,204 | $7,102 |
| Energy Efficient | Traulsen | G24310 | $9,690 | $4,845 |
| Energy Efficient | Traulsen | G24314P | $12,903 | $6,452 |
| Energy Efficient | Traulsen | RHF132W-FHS | $10,232 | $5,116 |
| Energy Efficient | Traulsen | RHF132W-HHS | $10,535 | $5,268 |
| Energy Efficient | Traulsen | RHF132WP-FHS | $12,291 | $6,146 |
| Energy Efficient | Traulsen | RHF132WP-HHS | $12,756 | $6,378 |
| Energy Efficient | Traulsen | RHF232W-FHS | $14,884 | $7,442 |
| Energy Efficient | Traulsen | RHF232W-HHS | $15,316 | $7,658 |
| Energy Efficient | Traulsen | RHF232WP-FHS | $18,271 | $9,136 |
| Energy Efficient | Traulsen | RHF232WP-HHS | $18,814 | $9,407 |
| Energy Efficient | Traulsen | RHF332W-FHS | $21,299 | $10,650 |
| Energy Efficient | Traulsen | RHF332W-HHS | $22,023 | $11,012 |
| Energy Efficient | Traulsen | RHF332WP-FHS | $26,553 | $13,277 |
| Energy Efficient | Traulsen | RHF332WP-HHS | $27,180 | $13,590 |
| Energy Efficient | Traulsen | RIH132L-FHS | $12,352 | $6,176 |
| Energy Efficient | Traulsen | RIH232L-FHS | $17,011 | $8,506 |
| Energy Efficient | Traulsen | RIH332L-FHS | $23,094 | $11,547 |

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

**Equipment Cost Data for Half-Size Hot Food Holding Cabinets**

| **Group** | **Make** | **Model** | **List Price ($)** | **Cost($)\*** |
| --- | --- | --- | --- | --- |
| Baseline | Alto-Shaam | 500-PH/GD | $1,866 | $933 |
| Baseline | Alto-Shaam | 500-S/120V/STD 202902 | $2,466 | $1,233 |
| Baseline | Carter-Hoffmann | HB125 | $4,784 | $2,392 |
| Baseline | Carter-Hoffmann | HBU8 | $3,720 | $1,860 |
| Baseline | Carter-Hoffmann | HWU8 (Glass and Steel Doors) | $4,340 | $2,170 |
| Baseline | Carter-Hoffmann | PH185 | $5,210 | $2,605 |
| Baseline | Cres Cor | H137WSUA5C | $5,698 | $2,849 |
| Baseline | Cres Cor | H33912188C | $3,950 | $1,975 |
| Baseline | Cres Cor | H339128C | $3,426 | $1,713 |
| Baseline | Cres Cor | H339SBS1210 | $3,606 | $1,803 |
| Baseline | Cres Cor | H339SS128C | $4,898 | $2,449 |
| Baseline | Cres Cor | H339UA8C | $4,516 | $2,258 |
| Baseline | Winston Industries | HC4009 | $6,868 | $3,434 |
| Baseline | FWE | MTU-4 (each cavity) | $5,288 | $2,644 |
| Baseline | FWE | P-60 | $5,062 | $2,531 |
| Baseline | FWE | PHU-4 (each cavity) | $5,586 | $2,793 |
| Baseline | FWE | PST-10 | $4,684 | $2,342 |
| Baseline | FWE | UHS-4 (each cavity) | $4,238 | $2,119 |
| Baseline | Giles Enterprises, Inc. | GHU-24x30 | $6,500 | $3,250 |
| Baseline | Giles Enterprises, Inc. | GHU-24x30 | $5,600 | $2,800 |
| Baseline | Hatco | FSHC-6W1 | $4,393 | $2,197 |
| Baseline | Hatco | FSHC-7 | $4,434 | $2,217 |
| Baseline | Hatco | FSHC-7-1 | $4,434 | $2,217 |
| Baseline | Hatco | FSHC-7-2 | $4,745 | $2,373 |
| Baseline | Metro | C190 | $3,207 | $1,604 |
| Baseline | Metro | C535-CFS-4 | $3,740 | $1,870 |
| Baseline | Metro | C565-NFC-U | $5,006 | $2,503 |
| Baseline | Metro | C565-NFC-UPFC | $5,771 | $2,886 |
| Baseline | Metro | C585-SFC-L | $6,089 | $3,045 |
| Baseline | Metro | TC90BB | $3,227 | $1,614 |
| Baseline | Metro | TC90S | $2,732 | $1,366 |
| Baseline | Royalton | RHHC-1000-C1 | $3,889 | $1,945 |
| Baseline | Vulcan | VBP33 | $2,890 | $1,445 |
| Baseline | Vulcan | VBP5I | $5,450 | $2,725 |
| Baseline | Vulcan-Hart | VHP3 | $4,210 | $2,105 |
| Baseline | Winston Industries | HA4005 | $6,225 | $3,113 |
| Baseline | Wittco | 1220-3 | $3,690 | $1,845 |
| Baseline | Wittco | 1826-5 | $4,730 | $2,365 |
| Baseline | Wittco | 1826-7 (solid-door version only) | $5,370 | $2,685 |
| Energy Efficient | Alto-Shaam | 1200-S | $3,042 | $1,521 |
| Energy Efficient | Cambro | CMBH1826L | $5,520 | $2,760 |
| Energy Efficient | Carter-Hoffmann | BB1824 | $7,130 | $3,565 |
| Energy Efficient | Carter-Hoffmann | PH181 (120V) | $5,356 | $2,678 |
| Energy Efficient | Cres Cor | H339SS12188C | $5,610 | $2,805 |
| Energy Efficient | Cres Cor | H339SSUA8C | $6,012 | $3,006 |
| Energy Efficient | FWE | HLC-SL-1826-5 (120v 1000W) | $4,352 | $2,176 |

\*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 Energy Efficient Hot Food Holding Cabinets\***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Category** | **Baseline Unit Price** | **Energy Efficient Unit Price** | **Incremental Price Difference** | **Baseline Unit Cost** | **Energy Efficient Unit Cost** | **Incremental Measure Cost (IMC)** |
| Full-Size  Hot Food Holding Cabinet | $7,156 | $11,828 | $4,673 | $3,578 | $5,914 | $2,336 |
| Half-Size  Hot Food Holding Cabinet | $4,527 | $5,289 | $762 | $2,263 | $2,644 | $381 |

\*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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2. *SPTdata\_format-v0.97.xls* from DEER Database for Energy-Efficient Resources; Version 2011 4.01 found at: [http://www.deeresources.com/2011](http://www.deeresources.com/index.php?option=com_content&view=article&id=68&Itemid=60) Under: DEER2011 Update Documentation linked at: [DEER2011 Database Format](http://www.deeresources.com/DEER2011/download/SPTdbFormat_Documentation.zip) Tab: (Implementation) Cells: (C225-C229) [↑](#endnote-ref-2)
3. The DEER Measure Cost Data Users Guide found on [www.deeresources.com](http://www.deeresources.com) under *DEER2011 Database Format* hyperlink, DEER2011 for 13-14, spreadsheet *SPTdata\_format-V0.97.xls.* [↑](#endnote-ref-3)
4. 2007 California Energy Commission (CEC) Title 20 Appliance Efficiency Regulations, CEC 400-2007-016, p. 112. [↑](#endnote-ref-4)
5. *EUL\_Summary\_10-1-08.xls* from DEER Database for Energy-Efficient Resources; Version 2011 4.01 found at: [http://www.deeresources.com/2011](http://www.deeresources.com/index.php?option=com_content&view=article&id=68&Itemid=60) Under: DEER2011 Update Documentation linked at: [EUL/RUL Values](http://www.deeresources.com/deer0911planning/downloads/DEER_EULS_4-14-08.doc) Cells: (D82) [↑](#endnote-ref-5)
6. 2004-2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report, pp. 3-15 to 3-18, table 3-14. [↑](#endnote-ref-6)
7. AutoQuotes electronic catalog for foodservice equipment and supplies <http://www.aqnet.com/> . [↑](#endnote-ref-7)