**Work Paper PGECOFST105**

**Insulated Holding Cabinet-Electric Revision # 5**

**Pacific Gas & Electric Company**

**Customer Energy Solutions**

**Insulated Holding Cabinet-Electric**

Measure Codes F110, F111

# At-A-Glance Summary — Insulated Holding Cabinets

|  |  |  |
| --- | --- | --- |
| **Applicable Measure Codes:** | **F110** | **F111** |
| **Measure Description:** | Insulated Holding Cabinet full size (20W/ft3) | Insulated Holding Cabinet Half size (20W/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 (5W/ft3) |
| **Base Case Energy Consumption:** | Source: PG&E Calculations  5,475kWh/yr. | Source: PG&E Calculations  2190 kWh/yr. |
| **Measure Energy Consumption:** | Source: PG&E Calculations  1,547kWh/yr. | Source: PG&E Calculations 274kWh/yr. |
| **Energy Savings (Base Case – Measure)** | Source: PG&E Calculations  3,928kWh/yr. | Source: PG&E Calculations 1916kWh/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  $2644 |
| **Measure Incremental Cost ($/unit):** | Source: PG&E Calculations $2336 | Source: PG&E Calculations $381 |
| **Effective Useful Life (years):** | **12 years**  (DEER EUL\_ID: Cook-HoldCab)  Source: [www.Deeresources.com](http://www.Deeresources.com) | **12 years**  (DEER EUL\_ID: Cook-HoldCab)  Source: [www.Deeresources.com](http://www.Deeresources.com) |
| **Program Type:** | Replace on Burnout (ROB), and New Construction (NC). | Replace on Burnout (ROB), and New Construction (NC). |
| **Net-to-Gross Ratios:** | **0.6** (DEER NTGR ID: Com-Default>2yrs)  Source: DEER 2016 | **0.6** (DEER NTGR ID: Com-Default>2yrs)  Source: DEER 2016 |
| **Important Comments:** |  |  |

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# Document Revision History

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Revision #** | | **Date** | **Description** | | **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) |
| Revision 5 | 3/30/2016 | | | Updated new format | | Denis Livchak (Fisher-Nickel, Inc.) |
| Revision 5 | 8/5/2016 | | | Updated calc tables to match online calculator ; updated formulas and incorporated examples | | Alina Zohrabian (PG&E)  Mini Damodaran (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 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.

**SCE 1, SCE 2, SCG 1, & SCG 2:** Southern California Gas and Electric will be further separating out the measure sizes for their programs.

***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.

Table 1. Energy Efficiency Requirements for Commercial Holding cabinets

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure Code** | **Cabinet Type** | **Volume** | **Idle Energy Rate**\* |
| F110 | Full Size | ≥ 15 ft.3 | ≤ 20 watts per ft3 |
| F111 | Half Size | < 15 ft.3 | ≤ 20 watts per ft3 |

\*Based on the heavy-load test in ASTM F2140

***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 Types

Table 2. Measure Application Type

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

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

## 1.4 Product Base Case and Measure Case Data

### 1.4.1 DEER Base Case and Measure Case Information

The DEER database for the 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 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. Holding Cabinets are mostly used in quick service restaurants, Table E-4 in Appendix E of CEC-500-2014-095 documents the operating hours of QSR establishments[[2]](#endnote-2):

**Base Case & Measure Case Costs**

The base case and measure case costs are calculated are found in section 4.

***Net-to-Gross Assumptions***

**Net-to-Gross Assumption:** NTG values were downloaded and used directly from DEER.

DEER NTGR Values file does not specifically list commercial food service appliances the default used for non-residential measures is 0.6**[[3]](#endnote-3)**.

All applicable DEER based Net-to-Gross ratios for programs that may be used by this measure are listed below.

Table 3. DEER Net-to-Gross Ratios

|  |  |
| --- | --- |
|  |  |
| NTG-ID | NTG |
| Com-Default>2yrs | 0.6 |

**Effective Useful Lives**

**Effective Useful Life:**EUL values were downloaded and used directly from DEER

DEER database shows a EUL of 12 years and an RUL of 4 years**[[4]](#endnote-4)** for all cooking appliance measures, including electric insulated holding cabinets.

Table 4. DEER Effective Useful Life

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure Code** | **EUL (yrs.)** | **RUL (yrs.)** | **DEER Version** | **EULID** |
| F110 | 12 | N/A | DEER2016 | Cook- HoldCab |
| F111 | 12 | N/A | DEER2016 | Cook- HoldCab |

**In Service Rate/ First Year Installation Rate**

The Installation Rate (IR) values were obtained using the DEER READI tool. The relevant IR values for the measures in this work paper are in the table below.

Table 5. Installation Rate

|  |  |  |  |
| --- | --- | --- | --- |
| **GSIA ID** | **Description** | **Sector** | **GSIA Value** |
| Def-GSIA | Default GSIA values | Com | 1 |

### 

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

#### California Title 20

California Title 20 Appliance Efficiency Standards does require reporting the insulated holding cabinet idle energy rate per ASTM F2140 for the CEC Appliance Database, but the standard contains no minimum performance requirement**[[5]](#endnote-5)**.

#### California Title 24

There are no State of California Title 24 Efficiency Regulation requirements for commercial holding cabinets.

#### Federal

#### There are no Federal energy efficiency requirements for commercial holding cabinets.

#### American Society for Testing and Materials (ASTM) Standards

ASTM Standard Test Method for theInsulated Holding Cabinets (F2140) is applicable for estimating 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

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**[[6]](#endnote-6)**,requiring all new commercial hot food holding cabinets to have a maximum normalized idle energy rate of 40 W/ft³ based on ASTM F2140.

Table 6. Base ASTM test results for Hot Food Holding Cabinets

|  |  |  |  |
| --- | --- | --- | --- |
| **Cabinet Size** | **Cabinet Volume (ft³)** | **Normalized Idle**  **Energy Rate (W/ft³)** | **Total Cabinet Idle Energy Rate (kW)** |
| Full-Size | 25 | 40 | 1.00 |
| Half-Size | 10 | 40 | 0.40 |

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 7 summarizes the average measure holding cabinet specifications.

Table 7. 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 (kW)** |
| 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.

Table 8. Hours of Operation

|  |  |  |
| --- | --- | --- |
| **Hours of Operation hrs./yr.** | **Reference** | **Measure code** |
| 5475 | ASTM2140 | F110 |
| 5475 | ASTM2140 | F111 |

### 1.4.5 Time of use Adjustment Factor

The TOU adjustment factor for all non A/C measures is 0.

# Section 2. Calculation Methods

## 2.1. Electric 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.

The energy savings calculations listed in Tables 9-10 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 9. Insulated Hot Food Holding Cabinet Cost Effectiveness Example - Full Size Holding Cabinets

|  |  |  |
| --- | --- | --- |
| **Performance** | **Baseline** | **Qualifying Model** |
| Cabinet Size (ft³) | 25 | 25 |
| Idle Energy Rate by Volume (w/ ft³) | 40 | 11.3 |
| Operating Hours per Day (h/day) | 15 | 15 |
| Annual Energy Use (kWh) | 5,475 | 1,547 |
| Annual Energy Savings (kWh) | - | **3,928** |
| Annual Energy Consumption Rate (kW) | 1.00 | 0.283 |
| Estimated Demand Reduction (kW) | - | 0.717 |
| Actual Demand Reduction with CDF of 0.9 applied (kW) | - | **0.645** |
| Estimated Useful Life (EUL)a | 12 | 12 |

a The estimated useful life is based on DEER EUL estimates

Table 10. Insulated Hot Food Holding Cabinet Cost Effectiveness Example - Half Size Holding Cabinets

|  |  |  |
| --- | --- | --- |
| **Performance** | **Baseline** | **Qualifying Model** |
| Cabinet Size (ft³) | 10 | 10 |
| Idle Energy Rate by Volume (w/ ft³) | 40 | 5 |
| Operating Hours per Day (h/day) | 15 | 15 |
| Annual Energy Use (kWh) | 2,190 | 274 |
| Annual Energy Savings (kWh) | - | **1,916** |
| Annual Energy Consumption Rate (kW) | 0.4 | 0.05 |
| Estimated Demand Reduction (kW) | - | 0.35 |
| Actual Demand Reduction with CDF of 0.9 applied (kW) | - | **0.315** |
| Estimated Useful Life (EUL)a | 12 | 12 |

a The estimated useful life is based on DEER EUL estimates

**Daily Energy Consumption Calculation and Definitions**

Where:

|  |  |
| --- | --- |
| EDAY = | Daily Energy Consumption (kWh/day) |
| CVOL = | Cabinet Size (ft³) |
| ERATE = | Idle Energy Rate (kW) |
| EHOU = | Estimated Operating Hours/Day |

**Daily Energy Consumption Example:**

Hand calculation may generate slightly different number due to rounding to significant digits.

## 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 717 Watts for a full-size holding cabinet and 350 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**[[7]](#endnote-7)** yields a Demand Savings of 645 Watts for a full-size hot food holding cabinet and 315 Watts for a half-size hot food holding cabinet.

## 2.3. Gas Energy Savings Estimation Methodologies

There is 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 non-residential 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.

## 3.2 Measure Load Shapes

For purposes of the net benefits estimates in the E3 calculator, what is required is the load shape that ideally represents the *difference* between the base equipment and the installed energy efficiency measure. This *difference* load profile is what is called the Measure Load Shape and would be the preferred load shape for use in the net benefits calculations.

The measure load shape for this measure is determined by the E3 calculator based on the applicable non-residential market sector and the foodservice end-use.

The electric demand profile for the high-efficiency electric commercial holding cabinet is expected to be the same as the Base Case. The profile will vary as explained in Section 3.1. The Measure Load Shape for the high-efficiency commercial holding cabinets will use less energy and have a lower demand profile.

# 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.

Equipment prices for these work papers were compiled from a number of sources including, Autoquotes, equipment sales reps and manufacturer sources**[[8]](#endnote-8)**. 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.

## 4.1 Base Cases Costs

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.

## 4.2 Measure 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 (see Appendix A).

## 4.3 Incremental & Full Measure Costs

Incremental measure costs are used in the analysis.

Table 11. Equipment Incremental Cost Data for Energy Efficient Insulated Holding Cabinets\*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Baseline Unit List Price** | **Energy Efficient Unit List 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 list prices from AutoQuotes catalog in 2012

# Appendix A

**Equipment Cost Data for Full Size Electric Holding cabinets Updated 2012**

|  |  |  |  |
| --- | --- | --- | --- |
| Designation | Group | List Price ($) | Cost ($)\* |
| B1 | Baseline | $7,899 | $3,950 |
| B2 | Baseline | $9,232 | $4,616 |
| B3 | Baseline | $4,016 | $2,008 |
| B4 | Baseline | $4,228 | $2,114 |
| B5 | Baseline | $8,710 | $4,355 |
| B6 | Baseline | $4,930 | $2,465 |
| B7 | Baseline | $9,940 | $4,970 |
| B8 | Baseline | $13,805 | $6,903 |
| B9 | Baseline | $13,711 | $6,856 |
| B10 | Baseline | $6,385 | $3,193 |
| B11 | Baseline | $6,438 | $3,219 |
| B12 | Baseline | $6,415 | $3,208 |
| B13 | Baseline | $7,644 | $3,822 |
| B14 | Baseline | $7,816 | $3,908 |
| B15 | Baseline | $8,784 | $4,392 |
| B16 | Baseline | $6,616 | $3,308 |
| B17 | Baseline | $6,753 | $3,377 |
| B18 | Baseline | $6,066 | $3,033 |
| B19 | Baseline | $7,810 | $3,905 |
| B20 | Baseline | $9,508 | $4,754 |
| B21 | Baseline | $3,466 | $1,733 |
| B22 | Baseline | $4,248 | $2,124 |
| B23 | Baseline | $4,472 | $2,236 |
| B24 | Baseline | $6,652 | $3,326 |
| B25 | Baseline | $7,649 | $3,825 |
| B26 | Baseline | $8,323 | $4,162 |
| B27 | Baseline | $4,967 | $2,484 |
| B28 | Baseline | $5,819 | $2,910 |
| B29 | Baseline | $6,009 | $3,005 |
| B30 | Baseline | $10,556 | $5,278 |
| B31 | Baseline | $5,260 | $2,630 |
| B32 | Baseline | $6,231 | $3,116 |
| B33 | Baseline | $7,169 | $3,585 |
| B34 | Baseline | $10,664 | $5,332 |
| B35 | Baseline | $5,649 | $2,825 |
| B36 | Baseline | $3,760 | $1,880 |
| EE1 | Energy Efficient | $6,285 | $3,143 |
| EE2 | Energy Efficient | $4,925 | $2,463 |
| EE3 | Energy Efficient | $4,526 | $2,263 |
| EE4 | Energy Efficient | $8,449 | $4,225 |
| EE5 | Energy Efficient | $5,128 | $2,564 |
| EE6 | Energy Efficient | $12,408 | $6,204 |
| EE7 | Energy Efficient | $8,840 | $4,420 |
| EE8 | Energy Efficient | $13,126 | $6,563 |
| EE9 | Energy Efficient | $16,990 | $8,495 |
| EE10 | Energy Efficient | $12,792 | $6,396 |
| EE11 | Energy Efficient | $13,652 | $6,826 |
| EE12 | Energy Efficient | $8,152 | $4,076 |
| EE13 | Energy Efficient | $8,076 | $4,038 |
| EE14 | Energy Efficient | $6,144 | $3,072 |
| EE15 | Energy Efficient | $5,632 | $2,816 |
| EE16 | Energy Efficient | $8,800 | $4,400 |
| EE17 | Energy Efficient | $12,032 | $6,016 |
| EE18 | Energy Efficient | $8,152 | $4,076 |
| EE19 | Energy Efficient | $5,893 | $2,947 |
| EE20 | Energy Efficient | $6,407 | $3,204 |
| EE21 | Energy Efficient | $8,400 | $4,200 |
| EE22 | Energy Efficient | $6,738 | $3,369 |
| EE23 | Energy Efficient | $7,545 | $3,773 |
| EE24 | Energy Efficient | $8,364 | $4,182 |
| EE25 | Energy Efficient | $6,288 | $3,144 |
| EE26 | Energy Efficient | $7,157 | $3,579 |
| EE27 | Energy Efficient | $7,208 | $3,604 |
| EE28 | Energy Efficient | $8,076 | $4,038 |
| EE29 | Energy Efficient | $7,782 | $3,891 |
| EE30 | Energy Efficient | $8,648 | $4,324 |
| EE31 | Energy Efficient | $9,190 | $4,595 |
| EE32 | Energy Efficient | $10,989 | $5,495 |
| EE33 | Energy Efficient | $9,151 | $4,576 |
| EE34 | Energy Efficient | $11,015 | $5,508 |
| EE35 | Energy Efficient | $13,317 | $6,659 |
| EE36 | Energy Efficient | $13,741 | $6,871 |
| EE37 | Energy Efficient | $16,365 | $8,183 |
| EE38 | Energy Efficient | $18,973 | $9,487 |
| EE39 | Energy Efficient | $23,695 | $11,848 |
| EE40 | Energy Efficient | $11,068 | $5,534 |
| EE41 | Energy Efficient | $15,238 | $7,619 |
| EE42 | Energy Efficient | $20,307 | $10,154 |
| EE43 | Energy Efficient | $7,293 | $3,647 |
| EE44 | Energy Efficient | $9,996 | $4,998 |
| EE45 | Energy Efficient | $6,962 | $3,481 |
| EE46 | Energy Efficient | $9,359 | $4,680 |
| EE47 | Energy Efficient | $10,149 | $5,075 |
| EE48 | Energy Efficient | $14,204 | $7,102 |
| EE49 | Energy Efficient | $9,690 | $4,845 |
| EE50 | Energy Efficient | $12,903 | $6,452 |
| EE51 | Energy Efficient | $10,232 | $5,116 |
| EE52 | Energy Efficient | $10,535 | $5,268 |
| EE53 | Energy Efficient | $12,291 | $6,146 |
| EE54 | Energy Efficient | $12,756 | $6,378 |
| EE55 | Energy Efficient | $14,884 | $7,442 |
| EE56 | Energy Efficient | $15,316 | $7,658 |
| EE57 | Energy Efficient | $18,271 | $9,136 |
| EE58 | Energy Efficient | $18,814 | $9,407 |
| EE59 | Energy Efficient | $21,299 | $10,650 |
| EE60 | Energy Efficient | $22,023 | $11,012 |
| EE61 | Energy Efficient | $26,553 | $13,277 |
| EE62 | Energy Efficient | $27,180 | $13,590 |
| EE63 | Energy Efficient | $12,352 | $6,176 |
| EE64 | Energy Efficient | $17,011 | $8,506 |
| EE65 | Energy Efficient | $23,094 | $11,547 |

\*Estimated purchase price and Incremental Measure Cost (IMC) were based on list prices from AutoQuotes catalog in 2012

**Equipment Cost Data for Half Size Electric Holding cabinets Updated 2012**

|  |  |  |  |
| --- | --- | --- | --- |
| Designation | Group | List Price ($) | Cost ($)\* |
| B1 | Baseline | $1,866 | $933 |
| B2 | Baseline | $2,466 | $1,233 |
| B3 | Baseline | $4,784 | $2,392 |
| B4 | Baseline | $3,720 | $1,860 |
| B5 | Baseline | $4,340 | $2,170 |
| B6 | Baseline | $5,210 | $2,605 |
| B7 | Baseline | $5,698 | $2,849 |
| B8 | Baseline | $3,950 | $1,975 |
| B9 | Baseline | $3,426 | $1,713 |
| B10 | Baseline | $3,606 | $1,803 |
| B11 | Baseline | $4,898 | $2,449 |
| B12 | Baseline | $4,516 | $2,258 |
| B13 | Baseline | $6,868 | $3,434 |
| B14 | Baseline | $5,288 | $2,644 |
| B15 | Baseline | $5,062 | $2,531 |
| B16 | Baseline | $5,586 | $2,793 |
| B17 | Baseline | $4,684 | $2,342 |
| B18 | Baseline | $4,238 | $2,119 |
| B19 | Baseline | $6,500 | $3,250 |
| B20 | Baseline | $5,600 | $2,800 |
| B21 | Baseline | $4,393 | $2,197 |
| B22 | Baseline | $4,434 | $2,217 |
| B23 | Baseline | $4,434 | $2,217 |
| B24 | Baseline | $4,745 | $2,373 |
| B25 | Baseline | $3,207 | $1,604 |
| B26 | Baseline | $3,740 | $1,870 |
| B27 | Baseline | $5,006 | $2,503 |
| B28 | Baseline | $5,771 | $2,886 |
| B29 | Baseline | $6,089 | $3,045 |
| B30 | Baseline | $3,227 | $1,614 |
| B31 | Baseline | $2,732 | $1,366 |
| B32 | Baseline | $3,889 | $1,945 |
| B33 | Baseline | $2,890 | $1,445 |
| B34 | Baseline | $5,450 | $2,725 |
| B35 | Baseline | $4,210 | $2,105 |
| B36 | Baseline | $6,225 | $3,113 |
| B37 | Baseline | $3,690 | $1,845 |
| B38 | Baseline | $4,730 | $2,365 |
| B39 | Baseline | $5,370 | $2,685 |
| EE1 | Energy Efficient | $3,042 | $1,521 |
| EE2 | Energy Efficient | $5,520 | $2,760 |
| EE3 | Energy Efficient | $7,130 | $3,565 |
| EE4 | Energy Efficient | $5,356 | $2,678 |
| EE5 | Energy Efficient | $5,610 | $2,805 |
| EE6 | Energy Efficient | $6,012 | $3,006 |
| EE7 | Energy Efficient | $4,352 | $2,176 |

\*Estimated purchase price and Incremental Measure Cost (IMC) were based on list prices from AutoQuotes catalog in 2012

References

1. American Society for Testing and Materials. *Standard Test Method for the Performance of Hot Food Holding Cabinets*. ASTM Designation F2140, in Annual Book of ASTM Standards, West Conshohocken, PA. [↑](#endnote-ref-1)
2. [*http://www.energy.ca.gov/2014publications/CEC-500-2014-095/CEC-500-2014-095.pdf*](http://www.energy.ca.gov/2014publications/CEC-500-2014-095/CEC-500-2014-095.pdf) [↑](#endnote-ref-2)
3. SupportTable\_NTG.csv, from DEER Database for Energy-Efficient Resources; Version 2016, READI v.2.4.3 (Current Ex Ante data) found at <http://www.deeresources.com/>

   [↑](#endnote-ref-3)
4. SupportTable\_EUL.csv, from DEER Database for Energy-Efficient Resources; Version 2016, READI v.2.4.3 (Current Ex Ante data) found at <http://www.deeresources.com/> [↑](#endnote-ref-4)
5. 2005 California Energy Commission (CEC) Title 20 Appliance Efficiency Regulations, CEC 400-2005-012, p. 69. [↑](#endnote-ref-5)
6. 2007 California Energy Commission (CEC) Title 20 Appliance Efficiency Regulations, CEC 400-2007-016, p. 112. [↑](#endnote-ref-6)
7. 2004-2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report, pp. 3-15 to 3-18, table 3-14. [↑](#endnote-ref-7)
8. AutoQuotes electronic catalog for foodservice equipment and supplies <http://www.aqnet.com/> [↑](#endnote-ref-8)