Work Paper SCE17RN024

**Revision 0**

**Southern California Edison**

**Refrigerated Storage Auto Closer**

# At-a-Glance Summary

|  |  |
| --- | --- |
| **Measure Codes** | RF-16925: Main Cooler Door Auto Closer  RF-32156: Main Freezer Door Auto Closer |
| **Measure Description** | Install automatic door closer on walk-in freezer or cooler doors |
| **Base Case Description** | Existing walk-in freezers or coolers without an automatic door closer |
| **Units** | Per unit (Freezer or Cooler) |
| **Energy Savings** | Refer to Excel Calculation Attachment 1. |
| **Full Measure Cost ($/unit)** | Refer to Excel Calculation Attachment 2. |
| **Incremental Measure Cost ($/unit)** | Refer to Excel Calculation Attachment 2. |
| **Effective Useful Life** | 6.67 years in accordance with Draft Resolution E-4807 [510] |
| **Measure Installation Type** | Retrofit Add-On (REA) |
| **Net-to-Gross Ratio** | Com-Default>2yrs , Agric-Default>2yrs , and Ind-Default>2yrs = 0.60  Com-Default-HTR-di, Agricult-Default-HTR-di, and Ind-Default-HTR-di = 0.85 |
| **Important Comments** | This work paper has a complementary Ex Ante Database data set that will be provided in a separate submission to the California Public Utilities Commission (CPUC). |

# Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 10/23/2016 | Theodore D’Williams/TRC | * This Work paper is an update of SCE13RN024.3 * New calculation template for 2017 program year * Gross and incremental measure costs updated * Updated the EUL value in accordance with Draft Resolution E-4807 [510] |

# Commission Staff and Cal TF Comments

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Rev** | **Party** | **Submittal Date** | **Comment Date** | **Comments** | **WP Developer Response** |
|  |  |  |  |  |  |

Cal TF website: <http://www.caltf.org/>

# Section 1. General Measure & Baseline Data

## 1.1 Measure Description & Background

This work paper details the Retrofit Add-on (REA) of main door auto closers or walk in freezers and coolers. The measure is to install auto closers on walk-ins where none was present. The base case of the measure is an existing walk-in cooler or freezer door without a door closer.

Base, Standard and Measure Cases

|  |  |
| --- | --- |
| **Case** | **Description of Typical Scenario** |
| Measure | Install auto closers on walk-ins |
| Existing Condition | Existing walk-in cooler or freezer door without a door closer |
| Code/Standard | N/A |
| Industry Standard Practice | N/A |

Measures and Codes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure Codes** | | | | **Measure Name** |
| SCG | SDG&E | SCE | PG&E |
| n/a |  | RF-16925 |  | Main Cooler Door Auto Closer |
| n/a |  | RF-32156 |  | Main Freezer Door Auto Closer |

**Eligibility Requirements**

* The auto-closer must be applied to the main insulated opaque door(s) of an existing walk-in cooler or freezer.
* The auto-closer must firmly close that door when it is within one inch of full closure.
* Auto-closer must be installed on a walk-in cooler or freezer manufactured before January 1, 2009.

## 1.2 Technical Description

Auto-closers on walk-in freezers and coolers can reduce the amount of time that doors are open, thereby reducing infiltration and refrigeration loads. The measures in this work paper are from DEER 2005 which assumes that auto-closers reduce infiltration by 40% on average. However, to update the measure to Title 20 (2014) compliance, the customer average, C13 (Code 13) case model was used as the baseline for this work paper. The base case of the measure is an existing walk-in cooler or freezer door without a door closer.

## 1.3 Installation Types and Delivery Mechanisms

The program/install types for the above measures are:

* Retrofit Add-on (REA)

The delivery method that is available for these measures is:

* Financial Support - Down-Stream Incentive – Deemed
* Financial Support - Direct Install

Installation Type Descriptions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Installation Type** | **Savings** | | **Life** | |
| 1st Baseline (BL) | 2nd BL | 1st BL | 2nd BL |
| Retrofit Add-on (REA) | Above Customer Existing |  | EUL |  |

A delivery mechanism is a delivery method paired with an incentive method. Delivery mechanisms are used by programs to obtain program participation and energy savings.

Delivery Method Descriptions

|  |  |
| --- | --- |
| **Delivery Method** | **Description** |
| Financial Support | The program motivates customers, through financial incentives such as rebates or low interest loans, to implement energy efficient measures or projects. |

Incentive Method Descriptions

|  |  |
| --- | --- |
| **Incentive Method** | **Description** |
| Direct Install | The program implements energy efficiency measures for qualifying customers, at no cost to the customer. |
| Down-Stream Incentive | The customer installs qualifying energy efficient equipment and submits an incentive application to the utility program. Upon application approval, the utility program pays an incentive to the customer. Such an incentive may be deemed or customized. |

## 1.4 Measure Parameters

### 1.4.1 DEER Data

The DEER Version 2014 1.0.5 [386] database contains measure energy savings and cost information for various measures as well as values from previous DEER versions. The applicable DEER Measure IDs D03-208 (RF-16925) and D03-209 (RF-32156) were not updated after DEER 2005. As a result, new simulation models using MASControl and eQUEST were generated to calculate the energy savings for solution code RF-16925 and RF-32156. DEER weather files and Title 20 (2014) code updates were considered in the measure runs. The Grocery DEER prototype building was used to calculate savings for all building types covered in this work paper. See Section 2 for more information.

DEER Difference Summary

|  |  |
| --- | --- |
| **DEER Item** | **Used for Work paper?** |
| Modified DEER methodology | Yes |
| Scaled DEER measure | No |
| DEER Base Case | Yes |
| DEER Measure Case | No |
| DEER Building Types | Yes |
| DEER Operating Hours | Yes |
| DEER eQUEST Prototypes | Yes |
| DEER Version | N/A |
| Reason for Deviation from DEER | DEER 2017 does not contain this type of measure. |
| DEER Measure IDs Used | N/A |

**Net-to-Gross Ratio**

The NTG values in the table below were obtained using the DEER READI tool v.2.4.7.

Net-to-Gross Ratio

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **NTGR ID** | **Description** | **Sector** | **BldgType** | **Measure Delivery** | **NTGR** |
| Com-Default>2yrs | All other EEM with no evaluated NTGR; existing EEM with same delivery mechanism for more than 2 years | Com | Any | All | 0.6 |
| Ind-Default>2yrs | All other EEMs with no evaluated NTGR; existing EEM in programs with same delivery mechanism for more than 2 years | Ind | Any | All | 0.6 |
| Agric-Default>2yrs | All other EEMs with no evaluated NTGR; existing EEM in programs with same delivery mechanism for more than 2 years | Ag | Any | All | 0.6 |
| Com-Default-HTR-di | All other EEM with no evaluated NTGR; direct install to hard-to-reach only. | Com | Any | DirInstall | 0.85 |
| Ind-Default-HTR-di | All other EEM with no evaluated NTGR; direct install to hard-to-reach only. | Ind | Any | DirInstall | 0.85 |
| Agricult-Default-HTR-di | All other EEM with no evaluated NTGR; direct install to hard-to-reach only. | Ag | Any | DirInstall | 0.85 |

Note: Direct install measures that are not hard-to-reach will use the default NTG value.

This work paper includes measures that are offered via direct install activities into hard-to-reach (HTR) customer facilities. “Final Resolution E-4700”, dated December 18, 2014, defines specific criteria to classify customer facilities as HTR and also states that two criteria are sufficient to identify HTR customers if one of the criteria met is the geographic criteria.

SCE’s Commercial Direct Install program delivers free and low cost energy efficiency hardware retrofits through installation contractors to reduce peak demand and energy savings for small and medium commercial customers. The barriers for customer participation include limited capital resources, lack of expertise and understanding of the understanding of the benefits of energy efficiency, a suspicion of the “free offer” and its legitimacy, and language and cultural barriers. The program also addresses the ongoing concern with “split incentives”, where the customer is not the owner of the property, and therefore, lack incentive to improve their energy usage. SCE’s Commercial Direct Install program will track the following three (3) customer data points to identify direct install activities in HTR customer facilities. If geography and business size criteria are satisfied, SCE will identify the customer as HTR. If geography and language criteria are satisfied, SCE will identify the customer as HTR. Other measures in the Commercial Direct Install program will receive default NTG (NTGR\_ID: Com-Default>2), unless otherwise specified in DEER.

* **Business Size** – Customer must have less than ten employees
* **Language** – Customer’s primary language spoken is not English
* **Geography** – Businesses in areas other than the United States Office of Management and Budget (OMB) Combined Statistical Areas (CSA) of the San Francisco Bay Area, the Greater Los Angeles Area and the Greater Sacramento Area or the OBM metropolitan statistical areas or San Diego County.

The “Required Corrections to Measure Level Input Parameters Identified by Commission Staff per D.14-10-046 Order Paragraph 16”, dated November 3, 2014, includes additional clarification for the geographic criteria:

“Notes on OMB CSA designations:

The OMB has designated a 12-county CSA titled the San Jose-San Francisco-Oakland, CA Combined Statistical Area which includes the nine counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma which border the San Francisco Bay plus the three counties of San Joaquin, Santa Cruz, and San Benito that are economically tied to the nine counties that that border the San Francisco Bay.”

The OMB definition of this CSA includes Los Angeles, Orange, San Bernardino, Riverside and Ventura counties.

The OMB definition of this CSA includes Sacramento, Yolo, El Dorado, Placer, Sutter, Yuba, and Nevada counties.

**Spillage Rate**

Spillage rates are not tracked in work papers; they are tracked in an external document which will be supplied to the Commission Staff.

**Installation Rate**

The IR values in the table below were obtained using the DEER READI tool v.2.4.7.

Gross Savings Installation Adjustment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **GSIA ID** | **Description** | **Sector** | **BldgType** | **ProgDelivID** | **GSIAValue** |
| Def-GSIA | Default GSIA values | Any | Any | Any | 1 |

**Effective and Remaining Useful Life**

The EUL and RUL values were obtained in accordance with Draft Resolution E-4807 [510]. DEER defines the RUL as 1/3 of the EUL value. The RUL value is only applicable to the first baseline period for an RET measure with an applicable code baseline.

Effectiveness Useful Life

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EUL ID** | **Description** | **Sector** | **UseCategory** | **EUL (Years)** | **RUL (Years)** |
| GrocWlkIn-DrClsr | Auto-Closer for Walk-In Cooler/Freezer Doors | Com | ComRefrig | 6.67 | 0 |

### 1.4.2 Codes and Standards Analysis

The 2015 Appliance Efficiency Regulations (Title 20) [422] Section 1605.1(a)(4)(A) provides the following requirements for walk-in coolers and freezers manufactured on or after January 1, 2009:

“(4) **Walk-In Coolers and Walk-In Freezers.** Walk-in coolers and walk-in freezers manufactured on or after January 1, 2009 shall:

(A) have automatic door closers that firmly close all walk-in doors that have been closed to within one inch of full closure, except that this subparagraph shall not apply to doors wider than three feet nine inches or taller than seven feet;”

The code does not apply to retrofit add-on measures, and therefore does not impact the measures in this work paper. However, the requirement of auto-closers applies to walk-ins manufactured on or after January 1, 2009.

Code Summary

|  |  |  |
| --- | --- | --- |
| **Code** | **Reference** | **Effective Dates** |
| Title 20 (2015) | Section 1605.1(a)(4) | July 1, 2015 |

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

### 1.5.1 Non-DEER Study Review

All references used in this work paper were from current or past DEER.

## 1.6 Data Quality and Future Data Needs

N/A

# Section 2. Calculation Methodology

The measures in this work paper are not in DEER 2017, so the energy savings were determined through building simulation in eQUEST 3.65 Refrigeration. Only the Grocery building type was simulated, and its savings were used for other building types because walk-in coolers and freezers generally have the same characteristics regardless of building type.

Prototype generation

MASControl v3.00.20 was used to generate the DEER 2014 Grocery prototype files using the following parameters:

•Building Type: Grocery

•Climate Zones: 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16

•Vintage: “14” (years 2014-2015)

•HVAC Type: Blank (Default)

•Thermostat Options: Blank (Default)

•Case Options: CAv (Customer Average), C13 (Code 2013)

•Tech ID: “D08-NE-HVAC-airAC-SpltPkg-135to239kBtuh-10p8eer”

The C13 case model was used as the baseline for this work paper. The Energy Division advised that the prototype’s refrigeration systems were not updated after DEER 2005 and therefore may not reflect industry standard practice and/or code. Since a non-refrigeration Tech ID was selected, the HVAC system, building envelope, and other systems should be compliant with Title 24 2016 standards.

Simulation

In order to create the measure cases, the baseline eQUEST model was edited. Infiltration into the coolers is modeled as a SOURCE load in the SPACE command. The measure applies a multiplier of 0.60 to the base case source load; effectively reducing infiltration by 40% on average.

This differs from the method used to estimate the energy savings in the DEER05 calculations. The DEER05 calculations assumed a 40% reduction in the source power of the cooler. The new method reduces the infiltration rate of the cooler as defined by the measure.

The simulation results were tabulated, and savings were determined; see Attachment 2. See Attachment 3 for the eQUEST files used.

Demand reduction: The DEER peak demand was calculated from the eQUEST hourly data by averaging the demand from 2pm to 5pm during the DEER peak period, which varies by climate zone.

A complete list of savings can be found within Attachment 1.

The table below shows sample cooler energy and demand savings for this work paper.

Energy and Demand Savings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Measure Name** | **Building Type** | **Climate Zone** | **Program Type (NEW, ROB, REA)** | **Annual Electricity Savings (kWh/unit)** | **kW Savings (kW/unit)** | **Therm Savings (Therm/unit)** |
| Main Cooler Door Auto Closer | Grocery | 1 | REA | 1416.80 | 0.44 | -0.09 |
| Main Cooler Door Auto Closer | Grocery | 2 | REA | 1798.93 | 0.64 | -0.61 |
| Main Cooler Door Auto Closer | Grocery | 3 | REA | 1836.79 | 0.58 | 0.12 |
| Main Cooler Door Auto Closer | Grocery | 4 | REA | 1910.31 | 0.52 | -0.12 |
| Main Cooler Door Auto Closer | Grocery | 5 | REA | 1725.22 | 0.31 | -0.10 |
| Main Cooler Door Auto Closer | Grocery | 6 | REA | 2327.34 | 0.30 | -0.98 |
| Main Cooler Door Auto Closer | Grocery | 8 | REA | 2429.11 | 0.56 | -0.11 |
| Main Cooler Door Auto Closer | Grocery | 9 | REA | 2298.13 | 0.65 | -0.08 |
| Main Cooler Door Auto Closer | Grocery | 10 | REA | 2264.48 | 1.24 | -0.07 |
| Main Cooler Door Auto Closer | Grocery | 11 | REA | 2110.15 | 0.79 | -0.13 |
| Main Cooler Door Auto Closer | Grocery | 12 | REA | 2074.98 | 0.46 | -0.60 |
| Main Cooler Door Auto Closer | Grocery | 13 | REA | 2342.68 | 0.79 | -0.06 |
| Main Cooler Door Auto Closer | Grocery | 14 | REA | 1813.65 | 1.22 | -0.05 |
| Main Cooler Door Auto Closer | Grocery | 15 | REA | 2356.39 | 0.37 | -0.05 |
| Main Cooler Door Auto Closer | Grocery | 16 | REA | 899.12 | 0.46 | -0.03 |

# Section 3. Load Shapes

The ideal load shape for net benefits estimates would represent the difference between the base case and measure case. The closest load shapes that are applicable to this measure are listed in the table below.

Building Types and Load Shapes

|  |  |  |
| --- | --- | --- |
| **Building Type** | **Load Shape** | **E3 Alternate Building Type** |
| Education - Primary School | Refrigeration | NON\_RES |
| Education - Community College | Refrigeration | NON\_RES |
| Education - University | Refrigeration | NON\_RES |
| Grocery | Refrigeration | NON\_RES |
| Health/Medical - Hospital | Refrigeration | NON\_RES |
| Health/Medical - Nursing Home | Refrigeration | NON\_RES |
| Lodging - Hotel | Refrigeration | NON\_RES |
| Office – Large | Refrigeration | NON\_RES |
| Office – Small | Refrigeration | NON\_RES |
| Restaurant - Fast-Food | Refrigeration | NON\_RES |
| Restaurant - Sit-Down | Refrigeration | NON\_RES |
| Retail - Multistory Large | Refrigeration | NON\_RES |
| Retail - Single-Story Large | Refrigeration | NON\_RES |
| Retail – Small | Refrigeration | NON\_RES |

# Section 4. Costs

## 4.1 Base Case Cost

For REA measures, the base case cost is equal to zero.

## 4.2 Measure Case Cost

The measure case cost is a result from online retailers. Material cost was $123.25, while labor of 1/2 hour (DEER READI Tool v.2.4.7) was $33.94, as a result, the full measure cost was $157.19.

## 4.3 Full and Incremental Measure Cost

### 4.3.1 Full Measure Cost

For REA measures, the full measure cost is equal to the incremental costs. Incremental costs are described in Section 4.2.

Full and Incremental Measure Cost Equations

|  |  |  |  |
| --- | --- | --- | --- |
| **Installation Type** | **Incremental Measure Cost** | **Full Measure Cost** | |
| **1st Baseline** | **2nd Baseline** |
| REA | MEC + MLC | MEC + MLC |  |

MEC = Measure Equipment Cost; MLC = Measure Labor Cost

BEC = Base Case Equipment Cost; BLC = Base Case Labor Cost

Full and Incremental Costs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure** | **Installation Type** | **Incremental Measure Cost** | **Full Measure Cost** | |
| **1st Baseline** | **2nd Baseline** |
| RF-16925 | REA | $157.19 | $157.19 |  |
| RF-32156 | REA | $157.19 | $157.19 |  |

# Attachments

1. SCE17RN024.0 A1 - Calculation Template\_Final.xlsm
2. SCE17RN024.0 A2 - Summary of eQuest Results.xlsx
3. SCE17RN024.0 A3 - eQuest Files.zip
4. SCE17RN024.0 A4 - Cost Calculation Template.xlsx

# References

1. References\_12122016\_100741.xlsx

[386]

[215]

[422]