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FOOD SERVICE

EXHAUST HOOD DEMAND CONTROLLED VENTILATION, COMMERCIAL

SWFS012-01

CONTENTS

MEASURE NAME

Commercial Kitchen Exhaust Hood Demand Controlled Ventilation

STATEWIDE MEASURE ID

SWFS012-01

TECHNOLOGY SUMMARY

Modern commercial kitchen ventilation has advanced beyond basic heat and smoke removal at the lowest first cost to systems that are more energy efficient and require less maintenance. In addition, there is a greater emphasis on comfort, kitchen indoor air quality, reduced noise levels, and improved fire safety.

Conventional kitchen ventilation controls mainly consist of a manual ON/OFF switch and a magnetic relay or motor starter for each fan. Exhaust and makeup air fans operate either at 100% speed or not at all. Occasionally, two-speed motor systems are utilized, which rely on the cook(s) to manually switch between the low- and high-speed settings; two-speed systems are an improvement but not a complete solution for the control over kitchen exhaust.

A commercial demand-controlled kitchen ventilation (DCKV) system is a demand-based energy management system for a commercial kitchen exhaust hood that minimizes fan energy use by reducing the exhaust and makeup air fan speed and associated energy consumption when little or no cooking is occurring. Furthermore, as a function of the exhaust fan speed and associated airflow reduction, outdoor makeup air heating and cooling energy is also reduced. In addition, the kitchen ambient noise level is significantly decreased.

The DCKV system is equipped with sensors and a microprocessor-based controller used in conjunction with variable speed drives for the fan motors, automatically modulating fan speed based on cooking load and/or time of day. The minimum ventilation rate is based on the energy and effluent output from the cooking appliances (i.e., the more heat and smoke/vapor generated, the more ventilation needed). Determining this involves installing temperature sensor(s) in the hood exhaust collar or within the hood, and/or an optic sensor(s) within the hood that senses cooking conditions. Doing so enables the control system to automatically vary the rate of exhaust to what is needed by adjusting the fan speed accordingly. Effective controller programming performed during system commissioning that is tailored for each equipment line and accompanying hood achieves optimal performance and savings. Cost-effectiveness for a facility increases proportionally with the ventilation system airflow rate, applied fan power, and operating time.

MEASURE CASE DESCRIPTION

This measure specifies the replacement of a manual ON/OFF switch and magnetic relay or motor starter ventilation control for commercial kitchen exhaust hoods with a control system that varies the exhaust rate based on the energy and effluent output from the cooking appliances. The controls operated based on the temperature sensors and/or infrared sensors to determine the cooking activity. DCKV systems typically consists of a variable speed drive, computer processor, user control interface (to enable, bypass, or disable the DCKV system), and active cook mode sensors (temperature, optical, infrared, or direct communication with cooking appliances).

BASE CASE DESCRIPTION

The base case is defined as a standard commercial kitchen ventilation system with single-speed exhaust and makeup air fans and a simple ON/OFF control.

CODE REQUIREMENTS

The 2019 California Building Energy Efficiency Standards (Title 24) Section 140.9(b)2B[1] specifies requirements for kitchens that have greater than 5,000 cfm total Type I and Type II kitchen hood exhaust. The standard lists four compliance options, one of which is installing demand controlled ventilation on 75% of exhaust air. Type I hoods are designed to remove heat, smoke, condensation, and other greasy by-products of cooking. Type II hoods are equipped to handle heat, steam, vapor, odors, and moisture from appliances that do not produce grease. Title 24 requirements apply to new kitchen exhaust hood installations; existing hoods are exempt. ANSI/ASHRAE/IES Standard 90.1-2016 Energy Standard for Buildings Except Low-Rise Residential Buildings[2] section 6.5.7.2.3 has the exact compliance option for systems with exhaust airflow rate greater than 5,000 cfm.

Applicable State and Federal Codes and Standards

Code	Applicable Code Reference	Effective Date
CA Appliance Efficiency Regulations – Title 20 (2018)	None.	n/a
CA Building Energy Efficiency Standards – Title 24 (2019)	Section 140.9(b)2B	January 1, 2020
ANSI/ASHRAE/IES Standard 90.1-2016	Section 6.5.7.2.3	1/1/2017

DCKV Installations on New Exhaust Hoods

Kitchens with more than 5,000 cfm of total hood exhaust: If a DCKV system is installed and none of the other compliance options are met, the DCKV system would be required by code. This measure would therefore be at code level and would have no savings beyond code.

In addition to installing DCKV, new kitchens may also comply with code if 1) at least 50% of replacement air is transfer air, 2) energy recovery devices with a minimum sensible effectiveness of 40% are installed on at least 50% of the total exhaust, or 3) at least 75% of makeup air is unheated or heated to a maximum of 60 degrees and uncooled or cooled without mechanical cooling. If one of these alternate compliance

[1] California Energy Commission (CEC). 2018. *2019 Building Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24).* CEC-400-2018-020-CMF-Standards

[2] American Society of Refrigeration and Air-conditioning Engineers (ASHRAE), 2016. *ANSI/ASHRAE/IES Standard 90.1-2016 Energy Standard for Buildings Except Low-Rise Residential Buildings*

options is met, DCKV would not be required by code. However, in these situations the DCKV system would be considered redundant and the energy savings would likely be reduced.

Kitchens that have less than 5,000 cfm of total hood exhaust: The code requirements do not apply and DCKV is an eligible measure.

DCKV Installations on Existing Exhaust Hoods

The 2013 Title 24 code included identical requirements for DCKV as 2019 Title 24, thus existing systems installed after the implementation of the 2013 Title 24 (July 1, 2014) which are greater than 5,000 cfm were required to have DCKV. Title 24 versions prior to 2013 Title 24 do not require DCKV. Therefore, systems installed prior to July 1, 2014 were not required to have DCKV, so all sizes are eligible for the add-on equipment measure.

To summarize, DCKV is eligible as follows:

- For Kitchens hood with <=5,000 cfm of total exhaust as New Construction (NC) install types for new installations or as Add-on Equipment (AOE) for all prior installations of kitchen hood.
- For Kitchens hood with >5,000 cfm as Add-on Equipment (AOE) for kitchen hoods installed before July 1, 2014.

For Kitchens hood with >5,000 cfm, DCKV is ineligible for any kitchen hood installations after July 1, 2014.

NORMALIZING UNIT

Rated horsepower (rated-hp).

PROGRAM REQUIREMENTS

Measure Implementation Eligibility

All combinations of measure application type, delivery type, and sector that are established for this measure are specified below. Measure application type is a categorization based on the circumstances and timing of the measure installation; each measure application type is distinguished by its baseline determination, cost basis, eligibility, and documentation requirements. Delivery type is the broad categorization of the delivery channel through which the market intervention strategy (financial incentives or other services) is targeted. This table also designates the broad market sector(s) that are applicable for this measure.

Note that some of the implementation combinations below may not be allowed for some measure offerings by all program administrators.

Implementation Eligibility for Investor-Owned Utilities

Measure Application Type	Delivery Type	Sector
Add-on Equipment	DnDeemDI	Com
Add-on Equipment	DnDeemed	Com
Add-on Equipment	UpDeemed	Com
New construction	DnDeemDI	Com
New construction	DnDeemed	Com
New construction	UpDeemed	Com

The customer must provide verification of total exhaust CFM controlled by the new or existing kitchen hood to verify eligibility of the measure (see Eligible Products, below).

Eligible Products

This measure pertains to the purchase and installation of a new commercial kitchen exhaust hood control system installed in an existing or a new dedicated commercial kitchen exhaust hood and makeup air system. Specific requirements include:

- The measure requires the installation of temperature sensor(s) in the hood exhaust collar or within the hood, and/or an optic sensor on the end of the hood or within the hood that senses cooking conditions and allows the system to automatically vary the rate of exhaust and make-up (ventilation) air by adjusting unit fan speeds accordingly.
- The installation of a DCKV must include a temperature or optic sensor that senses cooking conditions.
- The control system must be used in conjunction with a variable-speed drive (VSD) on the fan motor.
- Installations in a new exhaust hood must have a total kitchen hood airflow ≤ 5,000 cfm.
- If installed in an existing exhaust hood > 5,000 cfm, the existing hood must have been installed before July 1, 2014, when the 2013 California Building Energy Efficiency Standards (Title 24) standards came into effect. See Code Requirements.

Eligible Building Types and Vintages

This measure is applicable to any building type and any vintage. This measure is commonly installed in education, grocery, health/medical, lodging, office, and restaurant facilities.

Eligible Climate Zones

This measure is applicable in any California climate zone.

PROGRAM EXCLUSIONS

Used or rebuilt controls are not eligible.

Systems with total kitchen hood airflow > 5,000 cfm installed after 07/01/2014 are ineligible.

DATA COLLECTION REQUIREMENTS

Interval meter data to determine peak kW impact during the new DEER2020 peak period definition was available from 4 of the 11 field-monitored case study. These 4 studies are representative of the typical load profile of kitchen hood exhaust. Secondary research[3] was conducted to validate the load profile of kitchen hood exhaust and 4-9PM peak savings potential. There are several published studies from the

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[3] SWFS012-01 DCKV Secondary Research.docx

past focusing on the energy (kWh) savings potential. Limited information is available from these studies to determine the peak savings potential from 4-9PM. Either raw interval meter data could not be collected or the data from the studies are not representative of the building types where this measure is applicable. For the future updates, it is recommended to analyze raw data from the CEC Cookline Replacement project (https://fishnick.com/ceccook/) which is in the final stages of completion or gather and analyze raw data from several published studies covering all the applicable building types.

USE CATEGORY

FoodServ

ELECTRIC SAVINGS (KWH)

The annual unit energy saving (UES) is calculated as the difference between the baseline and measure case unit energy consumption (UEC).

Data to develop the UEC were collected from 11 field-monitored case studies conducted by the Pacific Gas and Electric Food Service Technology Center (PG&E FSTC), the Southern California Edison Foodservice Technology Center (SCE FTC), and ASHRAE[4]. The equipment at the 11 sites were power-meter monitored with and without demand-controlled kitchen ventilation (DCKV) to obtain both baseline and measure case UEC data.

The calculation of the exhaust fan unit energy consumption (UEC) (baseline or measure case) for each of the 11 sites is shown below.

$$UEC\_YEAR = POWER \times HOURS \times DAYS$$

$UEC\_YEAR = Annual\ unit\ energy\ consumption\ (kWh/yr)$

$POWER = Fan\ power\ (kW)$

$HOURS = Operating\ hours\ per\ day$

$DAY = Operating\ days\ per\ year$

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[4] Pacific Gas and Electric (PG&E). 2014. *Energy Management Systems (EMS) and Demand-controlled Ventilation (DCKV) Energy Savings in Restaurants.* Emerging Technologies Program #ET13PGE8151.

Fisher, D., R. Swiercayna, and A. Karas. 2013. "Future of DCV for Commercial Kitchens." ASHRAE Journal, February 2013. Page 48-54.

Southern California Edison (SCE), Design & Engineering Services. 2009. *Demand Control Ventilation for Commercial Kitchen Hoods.*

Fisher-Nickel, Inc. 2004. *Demand Ventilation in Commercial Kitchens—An Emerging Technology Case Study. Melink Intelli-Hood® Controls—Commercial Kitchen Ventilation System Intercontinental Mark Hopkins Hotel.* San Ramon, CA: Fisher-Nickel, Inc. FSTC Report # 5011.04.17.

Fisher-Nickel, Inc., 2006. *Demand Ventilation in Commercial Kitchens—An Emerging Technology Case Study. Melink Intelli-Hood® Controls—Supermarket Application.* San Ramon, CA: Fisher-Nickel, Inc. FSTC Report # 5011.06.13.

California Energy Commission (CEC). 2006. *Public Interest Energy Research (PIER) Program Case Study: Demand Ventilation Control in Commercial Kitchens, UC Berkeley—Clark Kerr Campus.*

California Energy Commission (CEC). 2007. *Public Interest Energy Research (PIER) Program Case Study: Demand Ventilation Control in Commercial Kitchens, UC Santa Barbara— Carrillo Dining Commons.*

The rated exhaust fan horsepower was selected as the single, standard unit of measure because of the larger degree of variance in makeup air system size, type, and complexity (e.g., some facilities do not have dedicated makeup air units, some have a high percentage of transfer air from rooftop equipment serving areas outside the kitchen, some DCKV systems are installed as exhaust-only controls, etc.). Although the energy savings were normalized to the rated exhaust fan horsepower, the estimated energy savings include both the exhaust fan and the makeup air fan energy use of the average system. Note that the electric savings do not account for any coincidental cooling savings due to reduced makeup airflow in the measure case.

The results from the 11 monitored sites were averaged to obtain the average power reduction values (and estimated average fan speed reduction values to be used later for gas saving calculations). The average energy reduction values were divided by the average rated exhaust fan horsepower values from the 11 sites to calculate normalized energy savings (kWh/hp).

Please refer to SWFS012-01 DCKV MeasureDataSpec.xlsx[5] for details of calculations. Refer to the following tabs in the work sheet:

- "Measure Specific Constants" for kWh and therms savings
- "Peak kW analysis" for kW savings
- "Cost Data" and "SCE Program Data" for cost analysis

PEAK ELECTRIC DEMAND REDUCTION (KW)

Interval meter data (5-minute interval) was collected for 6 of the 11 field monitored sites. For two of these sites, the exhaust fan rated HP or interval meter data for makeup air units was missing. Hence the data from 4 field monitored sites was analyzed to determine the peak kW savings during the DEER2020 peak kW definition (4PM-9PM)[6]. The following assumptions are while calculating the peak kW savings.

- The 4 sites include quick service restaurant and hotel main kitchen. It is assumed that these sites represent the typical load profile of kitchen exhaust hoods. Institutional cafeteria kitchens and supermarket kitchens are comparable to quick service restaurants and the casual dining kitchens are comparable to hotel main kitchens.
- DEER2020 peak kW period definition is for (3) specific days in the year from 4-9PM. The interval meter data was not available for the specific days. Hence, the average of the kW during any weekdays between 4-9PM is considered as peak kW. It is assumed that peak hours operation on the (3) specific days is like any weekday operation.

GAS SAVINGS (THERMS)

The calculation of annual gas unit energy savings (UES) of a commercial demand-controlled kitchen ventilation (DCKV) system is a function of the heating output, average fan speed reduction, and heating system efficiency.

[5] SWFS012-01 DCKV MeasureDataSpec.xlsx

[6] California Public Utilities Commission (CPUC). 2018. *Resolution E-4952.* October 11. Op 1.

$$UES\_YEAR = \frac{OACHeatOutput \times FanSpeedReduction}{EFF \times kBtuTherm}$$

$UES\_YEAR = Annual\ gas\ unit\ energy\ savings\ (kWh)$

$OACHeatOutput = O.A.C\ heating\ output\ (kBtu)$

$FanSpeedReduction = Average\ fan\ speed\ reduction\ (\%)$

$EFF = Heating\ system\ efficiency$

$kBtuTherm = Btu\ to\ therm\ conversion\ factor$

Data to calculate the gas UES was drawn from two sources:

- PG&E Food Service Technology Center (PG&E FSTC) and the Southern California Edison Foodservice Technology Center (SCE FTC) field monitoring of equipment at 11 sites.
- SCE FTC and PG&E FSTC, and Honeywell/Melink (a manufacturer of kitchen hood DCKV systems) gathered data from 72 additional commercial kitchen sites with exhaust hood DCKV systems. Exhaust fan horsepower, exhaust airflow rate, and operating hours per day were documented for a total of 72 sites. The averages of these values are used to determine the gas savings and measure cost for this measure.[7]

The average base case outdoor air load thermal requirements were determined by using the Outdoor Airload Calculator[8] for the 16 climate zones in California and inputting the average airflow rate reduction and operating time values from the 72 field sites documented by PG&E FSTC, SCE FTC, and Honeywell/Melink.

The average values from the field data and input assumptions are specified in the following table. The outdoor makeup airflow rate (cfm) was calculated as 80% of the exhaust airflow rate (professional judgement).

[7] Please refer to "Measure Specific Constants" tab in SWFS012-01 DCKV MeasureDataSpec.xlsx

[8] Food Service Technology Center (FSTC) Outdoor Airload Calculator (OAC); https://fishnick.com/ventilation/oalc/oac.php

Gas UES Inputs

Parameter	Value	Source
Exhaust airflow rate (cfm)	14,000	"72 site data in "Measure Specific Constants" tab in "SWFS012-01 Kitchen Exhaust Hood Demand Controlled Ventilation MeasureDataSpec.xlsx"
Daily hours of operation (input time: 7:00 a.m. to 12:00 a.m. midnight)	17	
Average fan speed reduction (and airflow rate reduction)	25%	
Outdoor makeup airflow rate (cfm)	11,200	Calculated as 80% of the exhaust airflow rate (professional judgement)
Heating setpoint (no dehumidification, and no lock-out months)	65 °F	Professional judgement.
Heating system efficiency (%)	80%	Professional judgement.

The normalized gas UES are based on the savings per rated exhaust fan horsepower (correlating average airflow rate cfm to average rated exhaust fan horsepower). For simplicity, the facility types and the climate zones were averaged to derive a single normalized gas UES value.

LIFE CYCLE

Effective useful life (EUL) is an estimate of the median number of years that a measure installed through a program is still in place and operable. Remaining useful (RUL) is an estimate of the median number of years that a technology or piece of equipment replaced or altered by an energy efficiency program would have remained in service and operational had the program intervention not caused the replacement or alteration.

The RUL is only applicable to the first baseline period for a retrofit measure with an applicable code baseline. The methodology to calculate the RUL conforms with Version 5 of the Energy Efficiency Policy Manual, which recommends "one-third of the effective useful life in DEER as the remaining useful life until further study results are available to establish more accurate values."[9] This approach provides a reasonable RUL estimate without requiring any a priori knowledge about the age of the equipment being replaced.[10]

For add-on equipment, (AOE) the RUL of the pre-existing ("host") equipment cannot exceed the EUL for the add-on equipment. Further, as per Resolution E-4807, the California Public Utilities Commission (CPUC) revised add-on equipment measures so that the EUL of the measure is equal to the lower of the RUL of the modified system or equipment or the EUL of the add-on component." [11]

The EUL and RUL established for a DCKV system are specified below. The EUL is the estimated lifetime for an energy management system (EMS), which was last updated for the 2006-2007 program cycle. The EUL for the host equipment is not known and thus capped at the 20-year maximum, as per policy of the California Public Utilities Commission (CPUC).

Effective Useful Life and Remaining Useful Life

Parameter	Value (years)	Source
EUL (yrs) – measure (EMS)	15.0	Pacific Gas and Electric (PG&E). 2004. *Retention Study of Pacific Gas & Electric Company's 1994 and 1995 Commercial Energy Efficiency Programs: 1994-1995 Commercial Lighting & HVAC Ninth Year Retention.* California Public Utilities Commission (CPUC), Energy Division. 2003. *Energy Efficiency Policy Manual v 2.0.* GDS Associates, Inc. 2007. Measure Life Report: *Residential and Commercial/Industrial Lighting and HVAC Measures.* Prepared for the New England State Program Working Group (SPWG). Table 2.
RUL (yrs) – host equipment	5.0	California Public Utilities Commission (CPUC), Energy Division. 2013. *Energy Efficiency Policy Manual, Version 5.* Page 32.

BASE CASE MATERIAL COST ($/UNIT)

The base case for this measure is a standard commercial kitchen ventilation system with single-speed exhaust and makeup air fans and a simple on/off control. Since the commercial kitchen ventilation system is required for both base case systems and demand-controlled ventilation systems, the base case material cost for the add-on equipment (AOE) measure offering is $0.00.

For the DCKV installation in a new exhaust hood the base case material costs were derived from data obtained from RSMeans online (2017) and normalized per horsepower. The base case materials and labor cost do not need updates over the years since it cancels out while calculating Incremental Measure Cost (IMC). The breakdown of costs is provided below.

Since the measure offering installed in a new exhaust hood is only applicable to systems ≤ 5,000 cfm, costs for five kitchen exhaust fans ≤ 5,000 cfm found in RSMeans online (2017) were used to create a linear fit line for both labor and material costs based on horsepower. The linear best fit line (R^2=0.9382) was used to extrapolate the labor and material costs based on the average horsepower of 1.25 hp, found from the SCE program data for measure costs of measures under 1.5 hp

No costs were included in the base case for the makeup air units due the variability found in the system type, size and existence.

Base Case Material Cost Inputs (New Installation)

Component	Material Cost ($)
Fans, Roof Mounted Kitchen Exhaust*	$1,126.28
Kitchen Exhaust Hood	$4,950.00
Controller	$248.00
Wiring	$348.00
Total Cost ($)	**$6,672.28**
Normalized Cost ($/hp)	**$5,337.82**

MEASURE CASE MATERIAL COST ($/UNIT)

The measure case material costs were derived from Southern California Edison (SCE) program data on (25) previous installations of the add-on equipment of exhaust kitchen hood DCV systems between 2013 and 2017. For the add-on equipment measure, the full measure costs include only the new controls costs for the DCV kitchen hood system. For the installation on a new exhaust hood, the full measure costs were assumed to include both the installation of the entire kitchen hood system (see Base Case Material Cost), and the incremental cost of adding the DCV system. Measure costs are adjusted for each climate zone using 2008 DEER cost adjustments for HVAC measures (HVAC50).

BASE CASE LABOR COST ($/UNIT)

The base case labor cost for AOE measure offering is $0.00.

Since the measure offering installed in a new exhaust hood is only applicable to systems ≤ 5,000 cfm, costs for five kitchen exhaust fans ≤ 5,000 cfm found in RSMeans online (2017) were used to create a linear fit line for both labor and material costs based on horsepower. The linear best fit line (R^2=0.9382) was used to extrapolate the labor and material costs based on the average horsepower of 1.25 hp, found from the SCE program data for measure costs of measures under 1.5 hp.

The breakdown of costs is provided below.

Base case Labor Installation Cost Inputs (New Installation)

Component	Labor Cost ($)
Fans, Roof Mounted Kitchen Exhaust*	$185.00
Kitchen Exhaust Hood	$168.00
Controller	$221.00
Wiring	$442.00
Total Cost ($)	**$1,016.00**
Normalized Labor Cost ($/hp)	**$812.80**

MEASURE CASE LABOR COST ($/UNIT)

The measure case material costs were derived from Southern California Edison (SCE) program data on (25) previous installations of the add-on equipment is inclusive of labor costs. Hence, for AOE install type, the measure labor cost is $0.00 and for NC install type the measure labor cost is same as base case labor cost.

NET-TO-GROSS (NTG)

The net-to-gross (NTG) ratio represents the portion of gross impacts that are determined to be directly attributed to a specific program intervention. These NTG values are based upon the average of all NTG ratios for all evaluated 2006 – 2008 commercial, industrial, and agriculture programs, as documented in the 2011 DEER Update Study conducted by Itron, Inc. These sector average NTGs ("default NTGs") are applicable to all energy efficiency measures that have been offered through commercial, industrial, and agriculture sector programs for more than two years and for which impact evaluation results are not available.

Net-to-Gross Ratios

Parameter	Value	Source
NTG – Commercial	0.60	Itron, Inc. 2011. *DEER Database 2011 Update Documentation.* Prepared for the California Public Utilities Commission. Page 15-4 Table 15-3.

GROSS SAVINGS INSTALLATION ADJUSTMENT (GSIA)

The gross savings installation adjustment (GSIA) rate represents the ratio of the number of verified installations of the measure to the number of claimed installations reported by the utility. This factor varies by end use, sector, technology, application, and delivery method. This GSIA rate is the current "default" rate specified for measures for which an alternative GSIA has not been estimated and approved.

Gross Savings Installation Adjustment Rate

Parameter	Value	Source
GSIA	1.0	California Public Utilities Commission (CPUC), Energy Division. 2013. *Energy Efficiency Policy Manual Version 5*. Page 31.

NON-ENERGY IMPACTS

Non-energy impacts for this measure have not been quantified.

DEER DIFFERENCES ANALYSIS

The table below summarizes the inputs and methods that are and are not based upon the Database for Energy Efficient Resources (DEER). This measure is not included in the 2017 DEER; DEER does not contain measures intended to reduce over-ventilation or that add variable speed drives to supply fan motors on damper-controlled VAV systems, both of which pertain to space conditioning systems that do not operate in the same manner as kitchen hood exhaust systems.

DEER Difference Summary

DEER Item	Comment / Used for Workpaper
Modified DEER methodology	No
Scaled DEER measure	No
DEER Base Case	No
DEER Measure Case	No
DEER Building Types	Yes
DEER Operating Hours	No
DEER eQUEST Prototypes	No
DEER Version	n/a
Reason for Deviation from DEER	DEER does not contain this type of measure.
DEER Measure IDs Used	n/a
NTG	Source: DEER. The NTG of 0.60 is associated with NTG IDs: *Com-Default>2yrs, Agric-Default>2yrs,* and *Ind-Default>2yrs*
GSIA	Source: DEER. The GSIA of 1.0 assigned as default. GSIA ID: *Def-GSIA*
EUL/RUL	Source: DEER 06-07, DEER 2014. EUL ID: *HVAC-EMS.* RUL ID: *20 yr maximum.*

REVISION HISTORY

Table 1. Measure Characterization Revision History

Revision Number	Date	Primary Author, Title, Organization	Revision Summary and Rationale for Revision Effective Date and Approved By
01	12/31/2018	Jennifer Holmes Cal TF Staff	Draft of consolidated text for this statewide measure is based upon: SCE17CC008 Revision 0 (November 28, 2017) PGECOFST116 Revision 5 (April 1, 2016) SCE13CC008 Revision 2 (January 21, 2016) WPSDGENRCC0019 Revision 1 (April 26, 2014) Consensus reached among Cal TF members.
	01/25/2019	Akhilesh Endurthy Solaris-Technical	DEER2020 updates for peak kW, Measure Application Type and Vintage Consolidation
	05/01/2020	Jesse Manao SCE	• Created separate EAD Table to the package. • Separated Offering IDs for NC and AOE (SWFS012A and SWFS012B). • Updated Statewide Measure ID in Measure Data Spec. • Split "Any" BT in the EnergyImpactExAnte.