Short Form Work Paper WPSDGERERN001

**Revision 3**

**San Diego Gas & Electric**

**Energy Efficiency Engineering**

**Residential Single Family and Multi-Family**

**Condenser Coil Cleaning**

**December 15, 2017**

# SDG&E Refrigerant Charge Adjustment

## Introduction

This short form workpaper documents the values from the READI v.2.4.7 energy impacts for Res-RCA-wtd - Residential RCA. SDG&E adopts the values in READI v2.4.7 with adjustment factors from Energy Division Workpaper Disposition for Residential HVAC Quality Maintenance dated May 2, 2013[[1]](#endnote-1). The costs are adopted from 2010-2012 WO17 Ex Ante Measure Cost Study[[2]](#endnote-2).

## Document Revision History

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| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 06/15/2012 | Unknown / SDG&E | Adopted from KEMA Services Inc, Residential Single Family and Multifamily Condenser Coil Cleaning WPKEM-RES-CON, Revision 1 dated November 2009. Updated NTGR to DEER 2011 |
| 0.1 | 06/27/2014 | Judelson Enriquez / RMS Energy Consulting, LLC | INTERNAL REVISION ONLY – no material impacts made |
| 1 |  |  |  |
| 2 | 12/01/17 | Keith Valenzuela/SDGE Contractor | Adopted READI v.2.4.7 energy impacts for DEER 2014 updates in accordance with Energy Division Workpaper Disposition for Residential HVAC Quality Maintenance dated May 2, 2013. |
| 3 | 12/15/17 | Keith Valenzuela/SDGE Contractor | Adopted READI v.2.4.7 energy impacts for DEER 2018 updates with adjustment factors from Energy Division Workpaper Disposition for Residential HVAC Quality Maintenance dated May 2, 2013. |

## Measure Summary

Table 1: Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form workpaper documents ex-ante load impacts and cost-effectiveness values for only cleaning the condenser coil in residential AC units. The base energy consumption and measure energy consumption values are from READI v.2.4.7 DEER ID Res-RCA-wtd with adjustment factors from Energy Division Workpaper Disposition for Residential HVAC Quality Maintenance dated May 2, 2013. |
| **1.1 Measure & Baseline Data** | |
| **1.2 Technical Description** | This measure involves cleaning the condenser coils in residential AC units. When an AC unit’s condenser coils are dirty it results in a decrease in the unit’s energy efficiency. Energy savings can be achieved by cleaning the condenser coils to allow proper airflow. |
| Measures | Measure:  Measure 1: 420138-Residential SF Condenser Coil Cleaning (DEER2018) |
| Code for All Measures | There are no energy efficiency standards or energy design standards for this measure.  The measure involves only residential retrofit, therefore, 2016 Title-24 code for non-residential efficiency requirements do not apply to this work paper.  2016 Title 20 does not address the state of the condenser coil as it is a code for new equipment it is assumed the AC unit is installed with a clean condenser coil. |
| Requirements | Per the SDG&E Quality Assurance and Quality Control Plan (QAQCP) technicians must receive training as follows:  **“**New technicians receive individual classroom training from the production supervisor and on-the-job training by serving as a helper from a certified trainer.  All technicians receive electrical training and follow safe electrical protocols, standards and practices.  Contractor regularly enrolls its technicians in technical training.  All technicians are required to attend a weekly tailgate meeting, plus a monthly technicians meeting for on-going training. The type of information that is covered in these training sessions would include measure and service standards, review of safety standards, motivation, customer service, and quality control instruction.  The production supervisor or assistant production manager also provides one-on-one training to technicians in the field.” |
| **1.3 Installation Type and Delivery Mechanisms** | |
| Installation Type | Retrofit Add-on (REA) |
| Delivery Mechanisms | Direct Install |
| **1.4.1 DEER Data** | |
| Net-to-Gross Ratio | Res-sAll-mHVAC-RCA |
| Effective and Remaining Useful Life | DEER EUL\_ID: HV-ResAC-CleanCoil  EUL= 3 years  RUL=1  Per READI v.2.4.7 |
| **Section 2. Calculation Methodology** | |
| Energy Savings/Peak Demand Reduction – All Measures | The annual energy and demand savings for the residential sector are based on adjusted DEER measure savings from Res-RCA-wtd. The READI v.2.4.7 values are adjusted based on Energy Division Workpaper Disposition for Residential HVAC Quality Maintenance dated May 2, 2013.  From Workpaper Disposition:  “Staff estimate that non-charge related services may account for an additional 25% savings on top of RCA. Based on this assessment, published DEER benefits are segregated into charge adjustment and non-charge adjustment remedies as follows:  Gross Charge Adjustment Savings = DEER values  Gross Non-Charge Adjustment Savings = DEER values \* 0.25  **Non-Charge Adjustment Savings Modifiers:**  There is no known evidence as to the relative impact from the three measures – condenser coil cleaning, evaporator coil cleaning and air flow adjustment - that generate non-charge adjustment savings. It is generally recognized that typical efficiency improvements associated with condenser coil cleaning is much larger than the other two. Given a paucity of direct measurements of field conditions, Commission staff recommends the following apportioning of non-charge adjustment savings among the three possible measures:  Condenser Coil Cleaning: 50% of the total  Evaporator Coil Cleaning: 25% of the total  Air Flow Adjustment: 25% of the total.”  In addition to these adjustments the disposition states savings were adjusted by incidence fractions.  From Workpaper Disposition:  “In addition to the fractions described above, staff also assigns the following incidence fractions to the gross savings results:  Condenser Coil Cleaning: 0.80  Evaporator Coil Cleaning: 0.60  Air Flow Adjustment: 0.60”  Workpaper Savings = DEER values \* 0.25\*0.50\*0.80  Measures:  420138-Residential SF Condenser Coil Cleaning  DEER2018 |
| **Section 3. Load Shapes** | |
| Load Shape | SDGE:DEER:HVAC\_Eff\_AC Annual |
| **Section 4. Cost** | |
| **Section 4.1 Base and Measure Costs** | |
| Base Cost | The base case is the customer’s existing equipment; therefore, the base case cost is $0.00. |
| Measure Cost | The 2010-2012 WO17 Ex Ante Measure Cost Study provides condenser coil cleaning per-ton costs by leveraging a sample size of ten direct install (DI) primary price data points from utilities over the past two program cycles (2010-2012 and 2013-2014).  The study provides costs per ton cooling for coil cleaning of $6.73 for materials and $25.65 for labor for a total cost of $32.38/ton. |

1. California Public Utilities Commission, Energy Division. Workpaper Disposition for

   Residential HVAC Quality Maintenance. Sacramento, CA (2013, May 2). Retrieved 12/1/17 at <http://deeresources.com/index.php/non-deer-workpapers>. [↑](#endnote-ref-1)
2. Itron. 2010-2012 WO017 Ex Ante Measure Cost Study Final Report. San Francisco, CA (2014, May 27). Retrieved 12/1/17 at <http://www.energydataweb.com/cpucFiles/pdaDocs/1100/2010-2012%20WO017%20Ex%20Ante%20Measure%20Cost%20Study%20-%20Final%20Report.pdf>. [↑](#endnote-ref-2)