**Work Paper PGE3PREF119**

**Efficient Condenser Multiplex**

**Revision # 2**

**PECI**

**EnergySmart Grocer**

**Efficient Condenser Multiplex**

**Measure Codes R111, R112, HA51, HA53**

**EnergySmart Grocer, PECI**

# At-a-Glance Summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Applicable Measure Codes:** | **R111** | **HA51** | **R112** | **HA53** |
| **Measure Description:** | Upgrade from 53 Btu/Watt @ 10°F TD to 85 Btu/Watt | Upgrade from 53 Btu/Watt @ 10°F TD to 85 Btu/Watt | Reduce design SCT by ~5°F and improve efficiency | Reduce design SCT by ~5°F and improve efficiency |
| **Energy Impact Common Units:** | Tons Cooling Capacity (CAP-TONS) | Tons Cooling Capacity (CAP-TONS) | Tons Cooling Capacity (CAP-TONS) | Tons Cooling Capacity (CAP-TONS) |
| **Base Case Description:** | Source: DEER 2008  Multiplex air cooled condenser of T24 efficiency, 80°F SCT | Source: DEER 2008  Multiplex air cooled condenser of vintage-dependent size,  efficiency and SCT setpoint | Source: DEER 2008  Multiplex evaporative condenser of T24 efficiency, 80°F SCT | Source: DEER 2008  Multiplex evaporative condenser of vintage-dependent size,  efficiency and SCT setpoint |
| **Base Case Energy Consumption:** | Source DEER 2008 generated through MAS Control v3.00.19  The base case energy consumption varies by climate zone and vintage. | Source DEER 2008 generated through MAS Control v3.00.19  The base case energy consumption varies by climate zone and vintage. | Source DEER 2008 generated through MAS Control v3.00.19  The base case energy consumption varies by climate zone and vintage. | Source DEER 2008 generated through MAS Control v3.00.19  The base case energy consumption varies by climate zone and vintage. |
| **Measure Energy Consumption:** | Source DEER 2008 generated through MAS Control v3.00.19  The energy efficient measure energy consumption varies by climate zone and vintage. | Source DEER 2008 generated through MAS Control v3.00.19  The energy efficient measure energy consumption varies by climate zone and vintage. | Source DEER 2008 generated through MAS Control v3.00.19  The energy efficient measure energy consumption varies by climate zone and vintage. | Source DEER 2008 generated through MAS Control v3.00.19  The energy efficient measure energy consumption varies by climate zone and vintage. |
| **Energy Savings (Base Case – Measure)** | Source DEER 2008 generated through MAS Control v3.00.19  The energy savings varies by climate zone and vintage. | Source DEER 2008 generated through MAS Control v3.00.19  The energy savings varies by climate zone and vintage. | Source DEER 2008 generated through MAS Control v3.00.19  The energy savings varies by climate zone and vintage. | Source DEER 2008 generated through MAS Control v3.00.19  The energy savings varies by climate zone and vintage. |
| **Costs Common Units:** | Tons Cooling Capacity (CAP-TONS) | Tons Cooling Capacity (CAP-TONS) | Tons Cooling Capacity (CAP-TONS) | Tons Cooling Capacity (CAP-TONS) |
| **Base Case Equipment Cost ($/unit):** | Source: DEER 2008 and PECI calculation  $571.39 | Source: DEER 2008  $0.00  (1st baseline) | Source: DEER 2008 and PECI calculation  $454.98 | Source: DEER 2008  $0.00  (1st baseline) |
| **Measure Equipment Cost ($/unit):** | Source: DEER 2008  $727.82 | Source: DEER 2008  $727.82 | Source: DEER 2008  $551.92 | Source: DEER 2008  $551.92 |
| **Full Measure Cost ($/unit)** | Source: DEER 2008 and PECI calculation  $156.43 | Source: DEER 2008  $893.52  (1st baseline) | Source: DEER 2008 and PECI calculation  $96.44 | Source: DEER 2008  $750.76  (1st baseline) |
| **Measure Incremental Cost ($/unit):** | Source: DEER 2008 and PECI calculation  $156.43 | Source: DEER 2008 and PECI calculation  $156.43 | Source: DEER 2008 and PECI calculation  $96.44 | Source: DEER 2008 and PECI calculation  $96.44 |
| **Effective Useful Life (years):** | Source: DEER 2008  15 Years | Source: DEER 2008  15 Years | Source: DEER 2008  15 Years | Source: DEER 2008  15 Years |
| **Measure Application Type:** | Replace on Burnout (ROB) | Early Retirement (ER) | Replace on Burnout (ROB) | Early Retirement (ER) |
| **Net-to-Gross Ratios:** | Source: DEER2011\_NTGR\_2012-05-16  0.6 | Source: DEER2011\_NTGR\_2012-05-16  0.6 | Source: DEER2011\_NTGR\_2012-05-16  0.6 | Source: DEER2011\_NTGR\_2012-05-16  0.6 |
| **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 |
| **Carolyn Weiner**  Principal, CES Products and Programs |

# Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| Revision # | Date | Section by Section Description of Revisions | Author (Company) |
| **Revision 0** | 4/7/2008 | Original short form work paper | PECI Engineering |
| **Revision 1** | 6/11/2012 | Updated to PG&E 2013-2014 format  Update cost data to reflect DEER 2008  Update EUL to reflect DEER 2008  Included Base Case Cost for ROB measures | Ricky Armendariz  (EnergySmart Grocer, PECI) |
| **Revision 2** | 5/14/2014 | Update 2014 weather files. Format update per PG&E guidelines | Ioana Anghel, PECI  Jason Ochs, PE, PECI |

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# Section 1. General Measure & Baseline Data

This workpaper details DEER measure D03-212 and D03-213 for replacing the existing low-temperature LT and medium-temperature MT condenser(s) with energy efficient condenser(s) of the same type (air-cooled or evaporative). This measure is defined for application on a multiplex system only.

## 1.1 Product Measure Description & Background

***Program Restrictions and Guidelines***

***Terms and Conditions:***

**Requirements:**

* Replace existing air-cooled or evaporative-cooled LT and MT condenser(s) with energy efficient condenser(s) of the same type (air or evaporative cooled).
* Measure applicable only to refrigeration systems having multiplex compressor systems
* The newly installed energy efficient condenser’s Saturated Condensing Temperature (SCT) set-point must be set to 70°F or less.
* For early retirement claims: The existing condenser must be in working order with no signs of replacement in the 12 months following the project application date.
* For air-cooled condenser only:
  + Specific energy efficiency of condenser must be greater than or equal to 85 Btu/hr/W when calculated at a 10°F TD.
  + Temperature differential (TD) between the SCT and ambient design temperature must be 15°F or less for MT applications and 10°F or less for LT applications.
* For evaporative-cooled condenser only:
  + Specific energy efficiency of condenser must be greater than or equal to 200 Btu/hr/W when calculated at a 100°F SCT at an ambient wet-bulb condition of 70°F.

**Additional Details:**

* Rebate subject to an engineering review to verify conformity with terms and conditions.
* Send completed rebate design checklist form and refrigeration schedule to your Field Energy Analyst or program headquarters to pre-qualify this measure for the rebate.

***Market Applicability:*** This is a replace on burnout or early retirement measure applicable to the grocery sector in a downstream rebate program. In order to qualify as replace on burnout the existing equipment must be unable to function as designed or demonstrate imminent failure. Failed equipment should also be replaced with similar technology that exceeds industry standard practice. In order to qualify for early retirement the existing equipment must be functioning as designed and show no evidence of imminent failure. The rebate encourages the grocer to replace their existing technology with equipment that is more energy efficient.

This paper contains savings for the grocery building type, 5 building vintage categories and 9 California climate zones.

## 1.2 Product Technical Description

This DEER measure replaces the existing refrigeration condenser(s) with an energy efficient condenser(s) of the same type (air-cooled or evaporative). This measure is defined for application on a multiplex system only.

## 1.3 Measure Application Types

The delivery method for this measure is downstream prescriptive rebate.

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*, defines the terms as follows:

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

*Identifies the measure application type in the Measure Implementation 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* |

## 1.4 Product Base Case and Measure Case Data

### 1.4.1 DEER Base Case and Measure Case Information

The data modeled using MASControl v3.00.19 includes: demand, electric, and interactive gas energy savings. DEER 2008 cost data includes: equipment unit costs, equipment incremental costs, and equipment useful life.

The original measures and energy models were created with DEER 2005. Measure information was updated in DEER 2008. The MAS Control tool that ran the batch simulations with the new 2014 T24 weather files appear to have pulled from the D08 version of the measure. We therefore cited the DEER 2008 measure with the update generated through most up to date version of MAS Control.

**Delta Wattage Assumption (ΔW):**

The peak EUL electric savings were downloaded from DEER using MASControl v3.00.19, they match the intended measures.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Electric Savings Watts** | **Deer units** | **DEER Version** | **Impact IDs** |
| GRO | 03 | Z01 | 45.8521 | tons | 2008 | D03 - 212 |
| GRO | 03 | Z02 | 29.7900 | tons | 2008 | D03 - 212 |
| GRO | 03 | Z03 | 11.2427 | tons | 2008 | D03 - 212 |

RUL Electric Savings **(ΔW):**

* The RUL electric savings were downloaded from DEER using MASControl v3.00.19, they match the intended measures

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Electric Savings Watts** | **Deer units** | **DEER Version** | **Impact IDs** |
| GRO | 03 | Z01 | 48.9109 | tons | 2008 | D03 - 213 |
| GRO | 03 | Z02 | 56.1267 | tons | 2008 | D03 - 213 |
| GRO | 03 | Z03 | 79.4443 | tons | 2008 | D03 - 213 |

**Therms Savings Assumption (ΔTh)**

EUL Gas Savings **(ΔTh):** The gas savings were downloaded from DEER MASControl v3.00.19; they match the intended measures and express interactive effects only. Intuitively gas savings do not seem applicable to this measure. However, DEER models report a very small impact in therms. We understand these negligible impacts to be noise in eQuest models and not represent significant changes in facility energy use.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Interactive Only?**  **Yes / No** | **Gas Savings Therms** | **Deer units** | **DEER Version** | **Impact IDs** |
| GRO | 03 | Z01 | Yes | 0.8307 | tons | 2008 | D03 - 212 |
| GRO | 03 | Z02 | Yes | 0.5990 | tons | 2008 | D03 - 212 |
| GRO | 03 | Z03 | Yes | 0.6861 | tons | 2008 | D03 - 212 |

RUL Gas Savings **(ΔTh):**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Interactive Only?**  **Yes / No** | **Gas Savings Therms** | **Deer units** | **DEER Version** | **Impact IDs** |
| GRO | 03 | Z01 | Yes | 0.5853 | tons | 2008 | D03 - 212 |
| GRO | 03 | Z02 | Yes | 0.4041 | tons | 2008 | D03 - 212 |
| GRO | 03 | Z03 | Yes | 0.4588 | tons | 2008 | D03 - 212 |

**Base Case Costs and Measure Case Costs**

The Measure Case and Labor Costs were downloaded from DEER 2008 MASControl v3.00.19; they match the intended measures for climate zones and building types and ages. Incremental cost is not included in DEER 2008 for these measures, so PECI calculated incremental cost using DEER 2005 data.

The incremental cost for the ER application of measures D03-212 and D03-213 was calculated by finding the ratio of cost increase for Equipment DEER 2005 to DEER 2008, and then applying that ratio to the DEER 2005 incremental cost for D03-212 and D03-213.

(DEER 2008 Equipment Cost / DEER 2005 Equipment Cost)\* DEER 2005 Incremental cost = PECI calculated Incremental Cost

D03-212: $727.82/$652.75 =1.115 \* $140.30 = $156.43

D03-213 $551.92/$495.00 = 1.115 \* $86.94 = $96.94

**Replace on Burnout (ROB):**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Costs ($)** | | |  |  |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Base Case** | **Measure Case** | **IMC** | **DEER Version** | **Impact IDs** |
| GRO | ALL | ALL | $571.39 | $893.52 | $156.43 | DEER 2008 and PECI calculation | D03-212 |
| GRO | ALL | ALL | $454.98 | $750.76 | $96.94 | DEER 2008 and PECI calculation | D03-213 |

**Early Retirement (ER):**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Costs ($)** | | |  |  |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Base Case** | **Measure Case** | **IMC** | **DEER Version** | **Impact IDs** |
| GRO | ALL | ALL | $0.00 | $893.52 | $893.52 | DEER 2008 | D03-212 |
| GRO | ALL | ALL | $0.00 | $750.76 | $750.76 | DEER 2008 | D03-213 |

The following table summarizes all applicable DEER based Net-to-Gross ratios for programs that may be used by this measure.

Table 2 DEER Net-to-Gross Ratios

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **DEER Spreadsheet** | |
| Program Approach | NTG | File name | Cell Number |
| EnergySmart Grocer | 0.60 | DEER2011\_NTGR\_2012-05-16 | T56 |

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

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **EUL (yrs)** | **RUL (yrs)** | **DEER Version** | **Impact IDs** |
| GRO | ALL | ALL | 15 | N/A | DEER 2008 | D03-212 |
| GRO | ALL | ALL | 15 | N/A | DEER 2008 | D03-213 |

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

The measure in this work paper is not governed by either state or federal codes and standards.

***Title 20:*** This measure does not fall under Title 20 of the California Energy Regulations.

***Title 24:*** No code changes. T24 p. 151 Exception to Section 120.6(b)1 - T24 is not invoked if total heat rejection (THR) is not increased and less than 25% of both attached compressors and display cases are new.

***Federal Standards:*** This measure does not fall under Federal DOE or EPA Energy Regulations.

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

No third party studies were identified during the development of the work paper that match the conditions specified by this measure. However, manufacturer data does indicate a substantial decrease in energy consumption for efficient condensers when compared to a typical industry baseline.[[2]](#endnote-2) Information on the base and measure condensers is found in the other sub-sections of 1.4.

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

There are no further data or calculations provided for the support of the measures in this work paper.

### 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. Additionally, if a measure is assigned a DEER08 load shape, i.e. the load shape starts with “DEER:” the TOU assigned to that measure should also be zero.

# Section 2. Calculation Methods

The savings for these measures are from DEER 2008 and generated through MASControl V3.00.19. The nonresidential technology codes selected was D08-NE-GrocRefg-Cndsr-AirCool-HiEff and D08-NE-GrocRefg-Cndsr-EvapCool-HiEff. The grocery building type was selected for PG&E climate zones (1,2,3,4,5,11,12,13,16) and vintage codes 75, 85, 96, 03, and 07. Savings and cost information can be found in the PGE3PREF119 R2 Excel document.

# Section 3. Load Shapes

The PG&E E3 Calculator “Measure Electric End Use Shape” for both the base case load shape and measure load shape is Commercial Refrigeration.

# Section 4. Base Case & Measure Costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure Application Type** | **Measure Life Basis** | **First Baseline Period Full Measure Cost (RUL)** | **Second Baseline Period Full Measure Cost (EUL – RUL)** |
| ***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 this measure. The Base Case Costs are:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Measure Code*** | **Measure Application Type** | **Baseline** | **Equipment Cost** | **Labor / Installation Cost** | **Maintenance / Other Cost** | **Total Base Case Cost** |
| D03-212 | ROB | Industry Standard | $571.39 | $165.70 | $0.00 | $737.09 |
| D03-212 | ER | Existing | $0.00 | $0.00 | $0.00 | $0.00 |
| D03-213 | ROB | Industry Standard | $454.98 | $198.84 | $0.00 | $653.82 |
| D03-213 | ER | Existing | $0.00 | $0.00 | $0.00 | $0.00 |

*All costs are noted as $ per measure unit*

## 4.2 Measure Case Costs

The following Measure Application Types are appropriate to this measure. The Measure Case Costs are:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Measure Code*** | **Measure Application Type** | **Baseline** | **Equipment Cost** | **Labor / Installation Cost** | **Maintenance / Other Cost** | **Total Measure Case Cost** |
| D03-212 | ROB | Existing | $727.82 | $165.70 | $0 | $893.52 |
| D03-212 | ER | Existing | $727.82 | $165.70 | $0 | $893.52 |
| D03-213 | ROB | Existing | $551.92 | $198.84 | $0 | $750.76 |
| D03-213 | ER | Existing | $551.92 | $198.84 | $0 | $750.76 |

*All costs are noted as $ per measure unit*

## 4.3 Incremental & Full Measure Costs

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

### 4.3.1 Full Measure Cost

Measure D03-212 and D03-213 are both ER and ROB measures. The Full measure costs are calculated for both approaches below.

This Measure Application Type is ER for the First baseline period only the Full Measure Cost (FMC) is represented by the equation below:

FMC = Measure Equipment Cost + Measure Labor Cost

FMC(D03-212) = $727.82/ ton + $165.70/ ton = $893.52/ ton

FMC(D03-213) = $551.92/ ton+ $198.84/ton = $750.76/ton

For ER in the second baseline period (EUL – RUL) period, FMC is represented by the equation below:

FMC = (-1) x (Base Equipment Cost + Base Labor Cost)

FMC(D03-212) = (-1) x ($571.39 /ton + $165.70/ ton) = - $737.09/ ton

FMC(D03-213) = (-1) x ($454.98/ ton + $198.84/ ton) = - $653.82/ ton

This Measure Application Type is ROB, so the Full Measure Cost (FMC) is represented by the equation below:

FMC = (Measure Equipment Cost + Measure Labor Cost) – (Base Case Equipment Cost + Base Case Labor Cost)

FMC(D03-212) = ($727.82/ ton + $165.70/ ton) – (571.39 /ton + 165.70/ ton) = $156.43/ton

FMC(D03-213)= ($551.92/ton+ $198.84/ ton) - ($454.98/ ton + $198.84/ ton) = $96.94/ton

\*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.

This Measure Application Type is ROB/ER. The Incremental Measure Cost (IMC) is represented by the appropriate equation below as there exists no base case with which to compare the measure to:

IMC = (Measure Equipment Cost + Measure Labor Cost) – (Base Case Equipment Cost + Base Case Labor Cost)

IMC(D03-212) *= (*$727.82 per ton + $165.70 per ton) – ($571.39 + $165.70) = $156.43/ton

IMC(D03-213) = ($551.92/ton+ $198.84/ ton) -($454.98/ ton + $198.84/ ton)= $96.94/ton

**Summary Table for Section 4**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Measure ID** | **Measure Application Types** | **Base Case Total Cost** | **Measure Case Total Cost** | **Full Measure Case Cost (1st baseline)** | **Incremental Measure Cost** |
| **D03-212** | ROB | **$571.39** | **$893.52** | **$156.43** | **$156.43** |
| **D03-212** | ER | **$0.00** | **$893.52** | **$893.52** | **$156.43** |
| **D03-213** | ROB | **$454.98** | **$750.76** | **$96.94** | **$96.94** |
| **D03-213** | ER | **$0.00** | **$750.76** | **$750.76** | **$96.94** |

# Appendix A: DEER Attributes

## Delta Wattage Assumptions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Electric Savings Watts** | **Deer units** | **DEER Version** | **Impact IDs** |
| GRO | 03 | CZ01 | 45.8521 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ02 | 29.7900 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ03 | 11.2427 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ04 | 48.5871 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ05 | 30.8957 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ11 | 30.9614 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ12 | 33.4464 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ13 | 37.0741 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ16 | 32.9462 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ01 | 187.5741 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ02 | 163.7962 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ03 | 182.3320 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ04 | 166.8596 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ05 | 187.0789 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ11 | 163.6619 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ12 | 191.3817 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ13 | 177.9334 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ16 | 157.9101 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ01 | 86.6253 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ02 | 11.7251 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ03 | 28.4733 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ04 | 6.3868 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ05 | 74.2889 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ11 | 10.1346 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ12 | 23.8525 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ13 | 11.3488 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ16 | 82.1075 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ01 | 62.1021 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ02 | 13.9472 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ03 | 8.4830 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ04 | 6.8108 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ05 | 65.6336 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ11 | 17.9749 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ12 | 23.5018 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ13 | 23.3126 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ16 | 57.4514 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ01 | 86.3725 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ02 | 82.3641 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ03 | 73.9752 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ04 | 66.3717 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ05 | 94.3421 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ11 | 69.0018 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ12 | 72.1504 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ13 | 74.6646 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ16 | 83.5999 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ01 | 45.5620 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ02 | 52.9634 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ03 | 53.5714 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ04 | 56.4487 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ05 | 38.4493 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ11 | 35.6614 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ12 | 67.7230 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ13 | 51.2975 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ16 | 13.2823 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ01 | 276.8446 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ02 | 252.2947 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ03 | 281.6501 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ04 | 276.0132 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ05 | 272.0519 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ11 | 234.8659 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ12 | 261.7110 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ13 | 262.9834 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ16 | 266.9418 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ01 | 282.5008 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ02 | 258.9799 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ03 | 278.2135 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ04 | 269.5633 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ05 | 277.1166 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ11 | 233.0706 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ12 | 249.6726 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ13 | 258.8549 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ16 | 266.6892 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ01 | 128.2216 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ02 | 115.0755 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ03 | 121.3501 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ04 | 110.5162 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ05 | 130.2137 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ11 | 120.6077 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ12 | 112.5929 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ13 | 114.5820 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ16 | 140.8851 | tons | 2008 | D03 - 213 |

## RUL Delta Wattage Assumptions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Electric Savings Watts** | **Deer units** | **DEER Version** | **Impact IDs** |
| GRO | 03 | CZ01 | 48.9109 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ02 | 56.1267 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ03 | 79.4443 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ04 | 96.2213 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ05 | 30.7576 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ11 | 38.0709 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ12 | 81.1725 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ13 | 85.5675 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ16 | 10.8469 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ01 | 45.5620 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ02 | 52.9634 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ03 | 53.5714 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ04 | 56.4487 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ05 | 38.4493 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ11 | 35.6614 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ12 | 67.7230 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ13 | 51.2975 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ16 | 13.2823 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ01 | 50.6588 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ02 | 62.9939 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ03 | 82.0231 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ04 | 92.5026 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ05 | 42.0400 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ11 | 43.3102 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ12 | 68.4522 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ13 | 87.1778 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ16 | 35.6967 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ01 | 51.3590 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ02 | 57.9654 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ03 | 79.1973 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ04 | 92.0441 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ05 | 42.7490 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ11 | 45.2908 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ12 | 68.5516 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ13 | 87.2174 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ16 | 38.8825 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ01 | 46.2391 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ02 | 52.5577 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ03 | 76.1868 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ04 | 76.6449 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ05 | 38.1076 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ11 | 41.3445 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ12 | 56.1755 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ13 | 79.4963 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ16 | 19.2127 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ01 | 18.4311 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ02 | 31.9016 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ03 | 20.4042 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ04 | 50.0955 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ05 | 0.0000 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ11 | 31.3510 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ12 | 33.9399 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ13 | 39.5292 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ16 | 11.1268 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ01 | 72.7748 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ02 | 96.7339 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ03 | 93.3508 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ04 | 101.8718 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ05 | 74.3212 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ11 | 93.8149 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ12 | 114.2283 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ13 | 95.7819 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ16 | 62.4656 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ01 | 17.0343 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ02 | 17.2121 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ03 | 5.3783 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ04 | 12.7341 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ05 | 3.1927 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ11 | 15.8137 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ12 | 24.0292 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ13 | 21.2647 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ16 | 13.8630 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ01 | 16.1868 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ02 | 19.5203 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ03 | 10.3580 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ04 | 28.0673 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ05 | 19.0232 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ11 | 22.8611 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ12 | 29.7011 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ13 | 26.1992 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ16 | 17.5388 | tons | 2008 | D03 - 212 |

## 

## Therms Savings Assumptions

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Interactive Only?**  **Yes / No** | **Gas Savings Therms** | **Deer units** | **DEER Version** | **Impact IDs** |
| GRO | 03 | CZ01 | Yes | 0.8307 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ02 | Yes | 0.5990 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ03 | Yes | 0.6861 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ04 | Yes | 0.5502 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ05 | Yes | 0.7058 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ11 | Yes | 0.4227 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ12 | Yes | 0.5076 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ13 | Yes | 0.4406 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ16 | Yes | 0.5779 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ01 | Yes | 0.2596 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ02 | Yes | 0.2012 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ03 | Yes | 0.2362 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ04 | Yes | 0.1753 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ05 | Yes | 0.2365 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ11 | Yes | 0.1258 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ12 | Yes | 0.1750 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ13 | Yes | 0.1509 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ16 | Yes | 0.1838 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ01 | Yes | 0.7011 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ02 | Yes | 0.4800 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ03 | Yes | 0.5800 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ04 | Yes | 0.4534 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ05 | Yes | 0.5817 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ11 | Yes | 0.3899 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ12 | Yes | 0.4324 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ13 | Yes | 0.3660 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ16 | Yes | 0.4587 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ01 | Yes | 0.9644 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ02 | Yes | 0.6652 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ03 | Yes | 0.8291 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ04 | Yes | 0.6308 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ05 | Yes | 0.8181 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ11 | Yes | 0.4811 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ12 | Yes | 0.5966 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ13 | Yes | 0.4795 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ16 | Yes | 0.6338 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ01 | Yes | 0.2509 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ02 | Yes | 0.2108 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ03 | Yes | 0.2311 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ04 | Yes | 0.2002 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ05 | Yes | 0.2551 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ11 | Yes | 0.1384 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ12 | Yes | 0.1687 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ13 | Yes | 0.1569 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ16 | Yes | 0.1810 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ01 | Yes | 0.0019 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ02 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ03 | Yes | 0.0019 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ04 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ05 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ11 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ12 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ13 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ16 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ01 | Yes | 0.3222 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ02 | Yes | 0.2320 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ03 | Yes | 0.2820 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ04 | Yes | 0.2174 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ05 | Yes | 0.2880 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ11 | Yes | 0.1813 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ12 | Yes | 0.2063 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ13 | Yes | 0.2056 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ16 | Yes | 0.2267 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ01 | Yes | 0.3288 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ02 | Yes | 0.2514 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ03 | Yes | 0.2899 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ04 | Yes | 0.2373 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ05 | Yes | 0.2930 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ11 | Yes | 0.1938 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ12 | Yes | 0.2083 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ13 | Yes | 0.1804 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ16 | Yes | 0.2431 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ01 | Yes | 0.4230 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ02 | Yes | 0.3289 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ03 | Yes | 0.4083 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ04 | Yes | 0.3197 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ05 | Yes | 0.3957 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ11 | Yes | 0.2404 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ12 | Yes | 0.2981 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ13 | Yes | 0.2455 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ16 | Yes | 0.2927 | tons | 2008 | D03 - 213 |

## RUL Therms Savings Assumptions

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Interactive Only?**  **Yes / No** | **Gas Savings Therms** | **Deer units** | **DEER Version** | **Impact IDs** |
| GRO | 03 | CZ01 | Yes | 0.5853 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ02 | Yes | 0.4041 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ03 | Yes | 0.4588 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ04 | Yes | 0.3690 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ05 | Yes | 0.4581 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ11 | Yes | 0.2860 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ12 | Yes | 0.3367 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ13 | Yes | 0.3019 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ16 | Yes | 0.3952 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ01 | Yes | -0.0013 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ02 | Yes | 0.0000 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ03 | Yes | 0.0000 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ04 | Yes | 0.0013 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ05 | Yes | 0.0013 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ11 | Yes | -0.0140 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ12 | Yes | -0.0066 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ13 | Yes | 0.0066 | tons | 2008 | D03 - 212 |
| GRO | 75 | CZ16 | Yes | 0.0000 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ01 | Yes | 0.4334 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ02 | Yes | 0.2956 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ03 | Yes | 0.3464 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ04 | Yes | 0.2623 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ05 | Yes | 0.3428 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ11 | Yes | 0.2266 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ12 | Yes | 0.2589 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ13 | Yes | 0.2227 | tons | 2008 | D03 - 212 |
| GRO | 85 | CZ16 | Yes | 0.2730 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ01 | Yes | 0.5552 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ02 | Yes | 0.3621 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ03 | Yes | 0.4352 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ04 | Yes | 0.3311 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ05 | Yes | 0.4294 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ11 | Yes | 0.2575 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ12 | Yes | 0.3203 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ13 | Yes | 0.2594 | tons | 2008 | D03 - 212 |
| GRO | 96 | CZ16 | Yes | 0.3552 | tons | 2008 | D03 - 212 |
| GRO | 03 | CZ01 | Yes | 0.0028 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ02 | Yes | 0.0013 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ03 | Yes | 0.0041 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ04 | Yes | 0.0110 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ05 | Yes | 0.0042 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ11 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ12 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ13 | Yes | 0.0013 | tons | 2008 | D03 - 213 |
| GRO | 03 | CZ16 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ01 | Yes | 0.0019 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ02 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ03 | Yes | 0.0019 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ04 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ05 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ11 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ12 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ13 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 07 | CZ16 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ01 | Yes | 0.0013 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ02 | Yes | 0.0026 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ03 | Yes | 0.0026 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ04 | Yes | 0.0026 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ05 | Yes | 0.0027 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ11 | Yes | 0.0013 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ12 | Yes | -0.0066 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ13 | Yes | 0.0013 | tons | 2008 | D03 - 213 |
| GRO | 75 | CZ16 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ01 | Yes | 0.0014 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ02 | Yes | 0.0026 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ03 | Yes | 0.0079 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ04 | Yes | 0.0013 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ05 | Yes | 0.0081 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ11 | Yes | 0.0013 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ12 | Yes | 0.0013 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ13 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 85 | CZ16 | Yes | 0.0000 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ01 | Yes | 0.0083 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ02 | Yes | 0.0040 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ03 | Yes | 0.0080 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ04 | Yes | 0.0067 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ05 | Yes | 0.0081 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ11 | Yes | 0.0025 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ12 | Yes | 0.0053 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ13 | Yes | 0.0039 | tons | 2008 | D03 - 213 |
| GRO | 96 | CZ16 | Yes | 0.0014 | tons | 2008 | D03 - 213 |

# References:

2004-2005 Database for Energy Efficiency Resources, Version 2.01, October 26, 2005, EEM D03-227 <http://eega.cpus.ca.gov/deer>.

*Revised DEER Measure Cost Summary (05\_30\_2008) Revised (06\_02\_2008).xls* from DEER for Energy-Efficient Resources: Version 2008 found at: <http://www.deeresources.com/index.php?option=com_content&view=article&id=65&Itemid=57> Under: Technology and Measure Cost Data Tab: NR-Commercial Refrigeration Rows: 33 and 34.

2012 Proposed 2013 Building Energy Efficiency Standards, Title 24, Part 6, and Associated Administrative Regulations in Part 1, May 2012 found at: <http://www.energy.ca.gov/title24/2013standards/index.html>

1. 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-1)
2. BOHN Air-Cooled Condenser With Microchannel Coil Technology NRG/NRJ Technical Bulletin found at <http://www.heatcraftrpd.com/PDF/Bohn%20Tech%20Bulletins%20Folder/BN-TB-C-AIRCOOLED-MCX.pdf> Page 5. “Capacity and Specifications” [↑](#endnote-ref-2)