Work Paper SCE13HC007

**Revision 2**

**Southern California Edison**

**High Efficiency Package Terminal Air Conditioners & Heat Pumps 24kBtu/h**

**(2 tons) and under**

# At-a-Glance Summary

|  |  |
| --- | --- |
| **Measure Codes** | AC-21823 <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner (Non Res) DX Equipment  AC-70989 <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner (Common Area) DX Equipment  AC-89607 <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner (Dwelling Area) DX Equipment  AC-37854 <=24 kBtu/hr High Efficiency Package Terminal Heat Pump (Non Res) DX Equipment  AC-93045 <=24 kBtu/hr High Efficiency Package Terminal Heat Pump (Common Area) DX Equipment  AC-10964 <=24 kBtu/hr High Efficiency Package Terminal Heat Pump (Dwelling Area) DX Equipment  AC-88667 <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner (Res) DX Equipment  AC-84199 <=24 kBtu/hr High Efficiency Package Terminal Heat Pump (Res) DX Equipment |
| **Measure Description** | High Efficiency Package Terminal Air Conditioners & Heat Pumps 24kBtu/h (2 tons) and under |
| **Base Case Description** | Title 24 Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps – Minimum Efficiency Requirements |
| **Units** | Tons of Cooling Capacity |
| **Energy Savings** | Refer to Excel Calculation Attachment |
| **Full Measure Cost ($/unit)** | Refer to Excel Calculation Attachment |
| **Incremental Measure Cost ($/unit)** | Refer to Excel Calculation Attachment |
| **Effective Useful Life** | 15 years for HVAC-PTAC, HVAC-PTHP, HV-ResAC, and HV-ResHP |
| **Measure Installation Type** | Replace on Burnout (ROB) |
| **Net-to-Gross Ratio** | Com-Default>2yrs - 0.60, Ind-Default>2yrs – 0.60, Agric-Default>2yrs – 0.60, Res-Default>2 – 0.55 |
| **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 | 4/4/2012 | James Gowen/Matrix | Updated work paper to new template  Added PG&E and SDG&E climate zones  Used new vintage weighting |
| 1 | 3/25/2014 | Justin Westmoreland, PE/AESC | -New template and updated DEER measures. |
| 4/17/2014 | Cassie Cuaresma/SCE | -Work paper updated for reporting period effective 7/1/2014-12/31/2014  -Added new solution codes for single family residential building type |
| 2 | 01/20/2016 | Andres Fergadiotti/SCE | -New template update for 2016 program year  -WP effective from 1/1/2016 thru 12/31/2016  -Removed SCE building types  -No value modifications |

# 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 replace on burnout (ROB) of package terminal air conditioning units (PTAC) or package terminal heat pumps (PTHP) that are through the wall, self-contained and less than or equal to 2 tons (<=24kBtu/h) with an EER that is 20% higher than the base case. The base case is a code compliant unit; Section 1.3 describes how to calculate the base case efficiency. Note that ductless mini-split air conditioners do not apply to this work paper.

PTACs & PTHPs are through-the-wall units usually less than or equal to 2 tons in capacity and are typically used to condition small areas that have wide swings in occupancy levels. As a result, they are most commonly used in hotels and motels where individual zone control is necessary. Please see the attached excel spreadsheet for the complete list of building types included in this work paper.

**Base, Standard, and Measure Cases**

|  |  |
| --- | --- |
| **Case** | **Description of Typical Scenario** |
| Measure | <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner / Heat Pump |
| Existing Condition | Title 24 Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps |
| Code/Standard | Min. Efficient Package Terminal Air Conditioner / Heat Pump |
| Industry Standard Practice | N/A |

Measures and Codes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure Codes** | | | | **Measure Name** |
| SCG | SDG&E | SCE | PG&E |
|  |  | AC-21823 |  | <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner (Non Res) DX Equipment |
|  |  | AC-70989 |  | <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner (Common Area) DX Equipment |
|  |  | AC-89607 |  | <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner (Dwelling Area) DX Equipment |
|  |  | AC-88667 |  | <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner (Res) DX Equipment |
|  |  | AC-37854 |  | <=24 kBtu/hr High Efficiency Package Terminal Heat Pump (Non Res) DX Equipment |
|  |  | AC-93045 |  | <=24 kBtu/hr High Efficiency Package Terminal Heat Pump (Common Area) DX Equipment |
|  |  | AC-10964 |  | <=24 kBtu/hr High Efficiency Package Terminal Heat Pump (Dwelling Area) DX Equipment |
|  |  | AC-84199 |  | <=24 kBtu/hr High Efficiency Package Terminal Heat Pump (Res) DX Equipment |

## 1.2 Technical Description

This measure requires the replace on burnout (ROB) of package terminal air conditioning units (PTAC) or package terminal heat pumps (PTHP) that are through the wall, self-contained and less than or equal to 2 tons (<=24kBtu/h) with an EER that is 20% higher than the base case.

To be eligible for a rebate, measure must meet the following minimum Energy Efficiency Ratio (EER) which exceeds the Title 24 Minimum (EER):

Measure and Title 24 (T24) EER

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Unit Capacity** | **T24 Minimum EER (AC)** | **T24 Minimum EER (HP)** | **Measure Minimum EER (AC)** | **Measure Minimum EER (HP)** |
| ≤ 7,000 Btu/hr | 9.41 | 9.31 | 11.29 | 11.17 |
| > 7,000 and ≤ 15,000 Btu/hr | 8.56 | 8.46 | 10.27 | 10.15 |
| >15,000 Btu/hr | 7.71 | 7.61 | 9.25 | 9.13 |

## 1.3 Installation Types and Delivery Mechanisms

The program/install types for the above measures are:

* Replace on Burn-out (ROB)

The delivery method that is available for these measures is:

* Financial Support - Down-Stream Incentive – Deemed

**Installation Type Descriptions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Installation Type** | **Savings** | | **Life** | |
| 1st Baseline (BL) | 2nd BL | 1st BL | 2nd BL |
| Replace on Burnout (ROB) | Above Code or Standard | N/A | EUL | N/A |

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** |
| 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 Package Terminal AC Units and Heat Pumps. The DEER Measure IDs D03-084, D03-099, and D03-100 were used for Package Terminal AC units, and the DEER Measure IDs D03-085, D03-101, and D03-102 were used for Package Terminal Heat Pumps.

DEER provided individual vintages along with multiple tiers of unit capacity ranges that were combined, via a weighted average. See Section 2 for more information.

DEER Difference Summary

|  |  |
| --- | --- |
| **DEER Item** | **Used for Workpaper?** |
| Modified DEER methodology | Yes |
| Scaled DEER measure | Yes |
| DEER Base Case | Yes |
| DEER Measure Case | Yes |
| DEER Building Types | Yes |
| DEER Operating Hours | Yes |
| DEER eQUEST Prototypes | Yes |
| DEER Version | DEER 2014 |
| Reason for Deviation from DEER | DEER had three measures that this work paper combines into one. DEER had the measures broken out by vintage, and this work paper takes a weighted average. |
| DEER Measure IDs Used | N/A |

**Net-to-Gross Ratio**

The NTG values were obtained using the DEER READI tool. The relevant NTG values for the measures in this work paper are in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **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 |
| Res-Default>2 | All other EEM with no evaluated NTGR; existing EEM with same delivery mechanism for more than 2 years | Res | Any | All | 0.55 |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **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 using the DEER READI tool. 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. The relevant EUL and RUL values for the measures in this work paper are in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EUL ID** | **Description** | **Sector** | **UseCategory** | **EUL (Years)** | **RUL (Years)** |
| HVAC-PTAC | Air Conditioners (packaged terminal AC) | Com | HVAC | 15 | 5 |
| HVAC-PTHP | Heat Pumps (packaged terminal) | Com | HVAC | 15 | 5 |
| HV-ResAC | High Efficiency Air Conditioner (package and split systems) | Res | HVAC | 15 | 5 |
| HV-ResHP | High Efficiency Heat Pump | Res | HVAC | 15 | 5 |

### 1.4.2 Codes and Standards Analysis

Title 24 2013 Minimum Efficiencies for PTAC and PTHP



* If the capacity (Cap) is less than 7,000 Btu/hr, use 7,000 Btu/hr for the capacity.
* If the capacity is >15,000 Btu/hr, use 15,000 Btu/hr for the capacity.
* Replacement units must be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEWLY CONSTRUCTED BUILDINGS." Replacement efficiencies apply only to units with existing sleeves less than 16 inches high or less than 42 inch wide and having a cross-sectional area less than 670 square inches.

Code Summary

|  |  |  |
| --- | --- | --- |
| **Code** | **Reference** | **Effective Dates** |
| Title 24 (2013) | Table 110.2-E Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps – Minimum Efficiency Requirements | July 1, 2014 |

## 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 and T24.

**1.6 Data Quality and Future Data Needs**

N/A

# Section 2. Calculation Methodology

DEER measures were used to calculate the energy savings and demand reduction for the measures in this work paper. The DEER 2014 database provided data on Packaged Terminal Air Conditioners and Heat Pumps for the following building types: Commercial, Lodging – Hotel, and Lodging - Motel. The savings for the Lodging - Motel building type were used for the Lodging - Motel building type as well as the Residential Multi-family (Common Area) and Single Family building type. The savings for Lodging - Hotel (Guest Rooms) was used for all other building types found in this work paper, including the Residential Multi-family (Dwelling Area) building type.

DEER Building Type Used for Measure Savings

|  |  |
| --- | --- |
| **Work Paper**  **Building Type** | **DEER Building Type used for Measure Savings** |
| Health/Medical - Nursing Home | Lodging – Hotel |
| Lodging - Hotel | Lodging – Hotel |
| Lodging - Guest Rooms | Lodging – Hotel |
| Lodging - Motel | Lodging - Motel |
| Manufacturing - Bio/Tech | Lodging – Hotel |
| Manufacturing - Light Industrial | Lodging – Hotel |
| Office – Large | Lodging – Hotel |
| Office – Small | Lodging – Hotel |
| Restaurant - Fast-Food | Lodging – Hotel |
| Retail – Small | Lodging – Hotel |
| Warehouse - Refrigerated | Lodging – Hotel |
| Residential Multi-family (Common) | Lodging - Motel |
| Residential Multi-family (Dwelling) | Lodging – Hotel |
| Residential Single Family | Lodging - Motel |

For non-DEER measures and/or measures that were scaled using DEER data, DEER provided data for the following unit capacity ranges for PTAC and PTHP units: <7 kBtuh, 7-15kBtuh, and >15kBtuh. These ranges were combined, via a weighted average, into one <=24kBtuh range for PTAC units and one <=24kBtuh range for PTHP units per the following table.

**Weight Averaged Installation data for PTAC/PTHP units**

|  |  |
| --- | --- |
| **Unit Capacity Ranges** | **% of Units Installed** |
| PTAC/PTHP  <7kBtuh | 5% |
| PTAC/PTHP  7-15kBtuh | 90% |
| PTAC/PTHP  >15kBtuh | 5% |

A survey of PTAC and PTHP unit installations at various hotels/motels was obtained. In this survey, individual hotels provided a breakdown of PTAC and PTHP unit capacity sizes that were installed at their facility over a period of 15 years. This survey was the only information available during the drafting of this work paper and was used to obtain the rough distribution of unit sizes shown in table above (which was used for the weighted average). The survey was not included in this work paper to maintain the confidentiality of the participants that were surveyed, but it is available from Southern California Edison upon request.

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

**Energy and Demand Savings**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Measure Name** | **Building Type** | **Climate Zone** | **Program Type (NEW, ROB, RET)** | **Annual Electricity Savings (kWh/ton)** | **kW Savings (kW/ton)** |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 1 | ROB | 219.20 | 0.1190 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 2 | ROB | 256.85 | 0.1590 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 3 | ROB | 261.20 | 0.1288 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 4 | ROB | 305.30 | 0.1582 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 5 | ROB | 290.83 | 0.1389 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 6 | ROB | 314.65 | 0.1097 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 7 | ROB | 378.45 | 0.1489 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 8 | ROB | 384.05 | 0.1687 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 9 | ROB | 370.50 | 0.1786 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 10 | ROB | 349.65 | 0.1781 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 11 | ROB | 292.90 | 0.1589 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 12 | ROB | 278.40 | 0.1583 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 13 | ROB | 362.55 | 0.1787 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 14 | ROB | 321.30 | 0.1589 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 15 | ROB | 513.00 | 0.1980 |
| High Efficiency Package Terminal Air Conditioner DX Equipment (<=24kBtu/h) | Lodging – Hotel | 16 | ROB | 219.40 | 0.1589 |

The following table indicates which measures are taken directly from or created with the DEER READI tool.

READI Data Used

|  |  |  |
| --- | --- | --- |
| **Measure Code** | **Measure Name** | **READI Data** |
| Various | High Efficiency Package Terminal Air Conditioner/Heat Pump Equipment (<=24kBtu/h) | See attachment 2 |

# 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 the measures in this work paper are listed in the table below.

Building Types and Load Shapes

|  |  |  |
| --- | --- | --- |
| **Building Type** | **Load Shape** | **E3 Alternate Building Type** |
| Health/Medical - Nursing Home | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Lodging - Hotel | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Lodging - Guest Rooms | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Lodging - Motel | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Manufacturing - Bio/Tech | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Manufacturing - Light Industrial | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Office - Large | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Office - Small | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Restaurant - Fast-Food | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Retail - Small | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Warehouse - Refrigerated | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Residential Single Family | DEER: HVAC\_Eff\_AC | RES |
| Residential Multi-family | DEER: HVAC\_Eff\_AC | RES |
| Health/Medical - Nursing Home | DEER:HVAC\_Split-Package\_HP | NON\_RES |
| Lodging - Hotel | DEER:HVAC\_Split-Package\_HP | NON\_RES |
| Lodging - Guest Rooms | DEER:HVAC\_Split-Package\_HP | NON\_RES |
| Lodging - Motel | DEER:HVAC\_Split-Package\_HP | NON\_RES |
| Manufacturing - Bio/Tech | DEER:HVAC\_Split-Package\_HP | NON\_RES |
| Manufacturing - Light Industrial | DEER:HVAC\_Split-Package\_HP | NON\_RES |
| Office - Large | DEER:HVAC\_Split-Package\_HP | NON\_RES |
| Office - Small | DEER:HVAC\_Split-Package\_HP | NON\_RES |
| Restaurant - Fast-Food | DEER:HVAC\_Split-Package\_HP | NON\_RES |
| Retail - Small | DEER:HVAC\_Split-Package\_HP | NON\_RES |
| Warehouse - Refrigerated | DEER:HVAC\_Split-Package\_HP | NON\_RES |
| Residential Single Family | DEER: HVAC\_Eff\_HP | RES |
| Residential Multi-family | DEER: HVAC\_Eff\_HP | RES |

# Section 4. Costs

## 4.1 Base Case Cost

The base case costs were taken from DEER2008. The cost of a standard PTAC was obtained by averaging the base case costs of cost case IDs: PTAC-lt7kBtuh-11p01eer, PTAC-7to15kBtuh-10p16eer, PTAC-gt15kBtuh-09p31eer, and then applying the climate zone cost factor from table HVAC50. The cost of a standard PTHP was obtained by averaging the base case costs of cost case IDs: PTHP-lt7kBtuh-10p81eer-3p02cop, PTHP-7to15kBtuh-9p96eer-2p91cop, PTHP-gt15kBtuh-9p11eer-2p80cop, and then applying the climate zone cost factor from table HVAC50. These ranges were combined, via a weighted average, into one <=24kBtuh range for PTAC units and one <=24kBtuh range for PTHP units per Weighted Averaged Installation data for PTAC/PTHP units table, earlier in the report.

Base Case Material Cost

|  |  |  |  |
| --- | --- | --- | --- |
| **Base Case** | **DEER Cost Case ID** | **Base Case -Code/Standard Material Cost** | **Weighted Average Base Case Cost** |
| Standard Package Terminal Air Conditioner DX Equipment | PTAC-lt7kBtuh-11p01eer | $1,258.00 | $1,048.80 |
| PTAC-7to15kBtuh-10p16eer | $1,061.00 |
| PTAC-gt15kBtuh-09p31eer | $620.00 |
| Standard Package Terminal Heat Pump DX Equipment | PTHP-lt7kBtuh-10p81eer-3p02cop | $1,272.00 | $1,092.70 |
| PTHP-7to15kBtuh-9p96eer-2p91cop | $1,104.00 |
| PTHP-gt15kBtuh-9p11eer-2p80cop | $710.00 |

## 4.2 Measure Case Cost

The measure case costs were taken from DEER2008. The cost of a high efficiency PTAC was obtained by averaging the measure material costs of cost case IDs: PTAC-lt7kBtuh-13p21eer, PTAC-7to15kBtuh-12p19eer, PTAC-gt15kBtuh-10p28eer, and then applying the climate zone cost factor from table HVAC50. The cost of a high efficiency PTHP was obtained by averaging the measure material costs of cost case IDs: PTHP-lt7kBtuh-12p97eer-3p62cop, PTHP-7to15kBtuh-11p95eer-3p49cop, PTHP-gt15kBtuh-10p93eer-3p37cop, and then applying the climate zone cost factor from table HVAC50. These ranges were combined, via a weighted average, into one <=24kBtuh range for PTAC units and one <=24kBtuh range for PTHP units per previous table (Weight Averaged Installation data for PTAC/PTHP units).

Measure Material Cost

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure Case** | **DEER Cost Case ID** | **Measure Material Cost** | **Weighted Average Measure Cost** |
| High Efficiency Package Terminal Air Conditioner DX Equipment | PTAC-lt7kBtuh-13p21eer | $1,342.00 | $1,099.75 |
| PTAC-7to15kBtuh-12p19eer | $1,105.00 |
| PTAC-gt15kBtuh-10p28eer | $763.00 |
| High Efficiency Package Terminal Heat Pump DX Equipment | PTHP-lt7kBtuh-12p97eer-3p62cop | $1,396.00 | $1,238.05 |
| PTHP-7to15kBtuh-11p95eer-3p49cop | $1,239.00 |
| PTHP-gt15kBtuh-10p93eer-3p37cop | $1,063.00 |

## 4.3 Full and Incremental Measure Cost

**Full and Incremental Measure Cost Equations**

|  |  |  |  |
| --- | --- | --- | --- |
| **Installation Type** | **Incremental Measure Cost** | **Full Measure Cost** | |
| **1st Baseline** | **2nd Baseline** |
| ROB | (MEC + MLC) – (BEC + BLC) | (MEC + MLC) – (BEC + BLC) | N/A |
| NEW/NC |

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** |
| <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner DX Equipment | ROB | $50.95 | $50.95 | N/A |
| <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner (Res) DX Equipment | ROB | $50.95 | $50.95 | N/A |
| <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner (Common Area) DX Equipment | ROB | $50.95 | $50.95 | N/A |
| <=24 kBtu/hr High Efficiency Package Terminal Air Conditioner (Dwelling Area) DX Equipment | ROB | $50.95 | $50.95 | N/A |
| <=24 kBtu/hr High Efficiency Package Terminal Heat Pump DX Equipment | ROB | $145.35 | $145.35 | N/A |
| <=24 kBtu/hr High Efficiency Package Terminal Heat Pump (Res) DX Equipment | ROB | $145.35 | $145.35 | N/A |
| <=24 kBtu/hr High Efficiency Package Terminal Heat Pump (Common Area) DX Equipment | ROB | $145.35 | $145.35 | N/A |
| <=24 kBtu/hr High Efficiency Package Terminal Heat Pump (Dwelling Area) DX Equipment | ROB | $145.35 | $145.35 | N/A |

# Attachments

1.

2.

3. 

# References



[386]