Work Paper PGE3PHVC160

**Revision 2**

**Short Form**

**Southern California Edison**

**Refrigerant Charge Adjustment (RCA)**

**Introduction**

This short form workpaper documents (WP) the values adopted from PGE’s WP entitled “Refrigerant Charge Adjustment” (PGE3PHVC160\_R3). SCE adopts all the values in PGE3PHVC160\_R3 – Refrigerant Charge Adjustment, with the following exceptions.

* This Workpaper Short Form is applicable for SCE’s 2019 program cycle
* Changed applicable climate zones to only SCE climate zones.
* Added Up-Stream Programs: Up-Stream delivery mechanism, Financial Support: Down-Stream Incentive – Deemed, and Financial Support: Direct Install.
* Added Agric-Default>2yrs and Ind-Default>2yrs NTG IDs for manufacturing building types.
* Added clarification on SCE’s incentive method description and applicability.
* For 2019 program year, the install type has been updated to Retrocommissioning, “BRO-RCx”.

# Document Revision History

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| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 1 | 12/27/2018 | Stephen Brett Reno, TRC | * Transferred savings to calculation templates the 2018 program year. * Changed applicable climate zones to only SCE climate zones. * Added Up-Stream Programs: Up-Stream, Financial Support: Down-Stream Incentive – Deemed, Financial Support: Direct Install delivery mechanisms. * Added Agric-Default>2yrs and Ind-Default>2yrs NTG IDs.   General Policy Requirements:   * 2018 Workpaper Updates are primarily in response to D.16-08-019 which created the Behavioral, Operational, and Retrocommissioning (BRO) measure classification with EUL values of one to three years with retrocommissioning assigned a three-year EUL. Resolution E-4818 directed that all measures which utilize a degraded performance baseline and/or are restorative of performance in nature be classified as retrocommissioning. |
| 2 | 12/27/2018 | Stephen Brett Reno, TRC | * Transferred savings to calculation templates the 2019 program year. * For 2019 program year, the install type has been updated to Retrocommissioning, “BRO-RCx”.   General Policy Requirements:   * 2019 Workpaper updates are primarily in response to Resolution E-4818 which added new measure application types including but not limited to Add-On Equipment (AOE) and BRO-Retrocommissioning (BRO-RCx). |

**Measure Summary**

Table 1: Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form work paper details refrigerant charge adjustment on existing nonresidential split-system and unitary HVAC equipment. The savings values are based on PGE’s workpaper PGE3PHVC160\_R3 – “Refrigerant Charge Adjustment” document.  The target market for this measure is nonresidential buildings served by unitary DX and split systems that do not serve process or refrigeration loads. These measures are defined for all SCE California climate zones and building types as indicated in Attachment #1. |
| **1.1 Measure & Baseline** | Baseline  This measure assumes the existing AC unit’s refrigerant is undercharged or overcharged by 4-50% as compared to the manufacturer specifications.  Measure  The refrigerant charge should be corrected to optimum levels based on the manufacturers’ specifications. |
| **1.2 Technical Description** |  |
| **Measures** | AC-20775 (HV387): Small Pkg AC system with No TXV, increase refrigerant charge from Typical under-charge (4 - 50%) to factory specified level  AC-20776 (HV390): Small Pkg AC system with TXV, increase refrigerant charge from Typical under-charge (4 - 50%) to factory specified level  AC-20777 (HV388): Small Pkg AC system with No TXV, decrease refrigerant charge from Typical over-charge (4 - 50%) to factory specified level  AC-20778 (HV389): Small Pkg AC system with TXV, decrease refrigerant charge from Typical over-charge (4 - 50%) to factory specified level  When an HVAC unit’s refrigerant charge does not meet the manufacturer recommended levels, it results in a decrease in the unit’s energy efficiency ratio (EER). Energy savings can be achieved by correcting refrigerant charge to optimum levels based on the manufacturers’ specifications.  Refer to PGE3PHVC160\_R3 Section 1.2 for detailed technical description. |
| **Code for All Measures** | These maintenance measures are not governed by either state or federal codes and standards. The document Standard 180-2008, Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systemsmay be used by QM programs as a guide for measure implementation. Only licensed California contractors will participate in the program. As required by the California State Licensing Board, contractors will be responsible for meeting all applicable codes. In general, maintenance and repairs do not require permits. |
| **Requirements** | This measure is only appropriate for 4-50% undercharged or overcharged units. Systems undercharged or overcharged by <4% are not eligible for claimed savings.  This measure requires field documentation of the existing conditions that verify the measure was necessary and that the measure was successfully applied. The diagnosis and correction must be performed in accordance with CPUC Resolution E-4867.  Refer to Section 1.1 of PGE3PHVC160\_R3 for additional information. |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| **Installation Type** | Deviation. Install type changed from Retro-Commissioning (RC) to **BRO-Retrocommissioning (BRO-RCx)** |
| **Delivery Mechanisms** | Mid-Stream Programs: Mid-Stream Incentive  Deviation from PG&E, Adding:   * **Financial Support: Direct Install** * **Financial Support: Down-Stream Incentive – Deemed** * **Up-Stream Programs: Up-Stream Incentive**   For SCE, incentive methods include On-bill Finance/Loan - The program offers financing for the cost an efficient measure as part of the utility bill. This can be an add-on option to an existing program or can serve as an organizing principle for its own program. |
| **1.4.1 DEER Data** |  |
| **Net-Gross-Ratio** | Deviating from PG&E’s NTG Section.  All Non-Upstream NTG ID:   * NonRes-sAll-mHVAC-RCA (NTGR: 0.73)   Midstream & Upstream NTG IDs:   * Com-Default>2yrs (NTGR: 0.60) * Ind-Default>2yrs (NTGR: 0.60) * Agric-Default>2yrs (NTGR: 0.60) |
| **Effective and Remaining Useful Life** | EUL ID: HVAC-RefChg (EUL: 3.0 / RUL: 3.0)  Per Resolution E-4818, measures resulting in performance that does not exceed the nominal efficiency of the pre-existing equipment have an effective useful life not to exceed three years, and for this reason the EUL and RUL of this measure are capped at three years. |
| **Section 2. Calculation Methodology** |  |
| **Energy savings/Peak Demand Reduction – All Measures** | DEER UES values are used; no calculation methodology was used in this workpaper to derive UES values. UES values are per ton of unit capacity. For units with multiple refrigerant circuits, UES values are only to be applied to the tonnage of the circuit being recharged, not the total unit tonnage. |
| **Section 3. Load Shapes** | DEER:HVAC\_Split-Package\_AC |
| **Section 4. Costs** | Refer to Section 4 of full workpaper PGE3PHVC160\_R3 for detailed costing methodology. |
| **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** | Material: $8.32/ton  Labor: $39.17/ton  Total: $47.49/ton |

**Savings and Calculation Methodology**

This short form made no changes to the adopted PGE savings.

**Costs**

This short form made no changes to the adopted PGE costs.

**Attachments:**

PGE3PHVC160.2\_A1 - Calc Templates\_2019