Short Form Work Paper WPSDGEREHC1066

**Revision 0**

**San Diego Gas & Electric**

**Energy Efficiency Engineering**

**Attic Insulation**

**December 22, 2017**

# SDG&E Envelope Insulation

## Introduction

This short form workpaper adopts the READI v.2.4.7 energy impacts for RB-BS-CeilIns-VintR-AddR19, RB-BS-CeilIns-VintR-AddR11 and RB-BS-CeilIns-R0-R38. The costs are adopted from 2010-2012 WO17 Ex Ante Measure Cost Study[[1]](#endnote-1).

## Document Revision History

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| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 12/22/17 | Keith Valenzuela/SDGE Contractor | * Adopted READI v.2.4.7 energy impacts for DEER 2017 RB-BS-CeilIns-VintR-AddR19, RB-BS-CeilIns-VintR-AddR11 and RB-BS-CeilIns-R0-R38. |
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## Measure Summary

Table : Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form workpaper documents ex-ante load impacts and cost-effectiveness values for installing insulation to an attic or knee wall. The base energy consumption and measure energy consumption values are from READI v.2.4.7.  This short form workpaper details the energy impacts of installing insulation to the attic or knee wall of a home. Knee walls are vertical walls with attic space directly behind them. |
| **1.1 Measure & Baseline Data** | |
| **1.2 Technical Description** | This measure involves installing insulation to the attic or knee walls of a home. Installing insulation creates a better barrier between the conditioned space of the home and outside or unconditioned spaces. This will save energy by reducing the heating or cooling required to make up for lost heating and cooling. |
| Measures | Measures:  Measure 1:  434009 - M09: R19-R38 Attic Insulation (RB-BS-CeilIns-VintR-AddR19)  434012 - M12: Knee Wall Insulation R19 (RB-BS-CeilIns-VintR-AddR19)  Measure 2:  434010 - M10: R11-R38 Attic Insulation (RB-BS-CeilIns-VintR-AddR11)  Measure 3:  434011 - M11: R0-R38 Attic Insulation (RB-BS-CeilIns-R0-R38) |
| Code for All Measures | ***Title 20:*** This measure does not fall under Title 20 of the California Energy Regulations.  ***Title 24:*** These measures do fall under Title 24 2016 of the California Energy Regulations. Under this regulation the following is required:  SECTION 110.8 (d) Installation of Insulation in Existing Buildings. Insulation installed in an existing attic, or on an existing duct or water heater, shall comply with the applicable requirements of Subsections 1, 2, and 3 below. If a contractor installs the insulation, the contractor shall certify to the customer, in writing, that the insulation meets the applicable requirements of Subsections 1, 2, and 3 below. 1. Attics. If insulation is installed in the existing attic of a low-rise residential building, the R-value of the total amount of insulation (after addition of insulation to the amount, if any, already in the attic) shall meet the requirements of Section 150.0(a).  EXCEPTION to Section 110.8(d)1: Where the accessible space in the attic is not large enough to accommodate the required R-value, the entire accessible space shall be filled with insulation provided such installation does not violate Section 1203.2 of Title 24, Part 2”  “SECTION 150.0 (a) Ceiling and Rafter Roof Insulation. The opaque portions of ceilings and roofs separating conditioned spaces from unconditioned spaces or ambient air shall meet the requirements of Items 1 through 3 below: 1. Shall be insulated to achieve a weighted average U-factor not exceeding U-0.043 or shall be insulated between wood-framing members with insulation resulting in an installed thermal resistance of R-22 or greater for the insulation alone. For vented attics, the mandatory insulation shall be installed at the ceiling level; for unvented attics, the mandatory insulation shall be placed at either ceiling or roof level; and EXCEPTION to Section 150.0(a)1: Ceilings and rafter roofs in an alteration shall be insulated to achieve a weighted average U-factor not exceeding 0.054 or shall be insulated between wood-framing members with insulation resulting in an installed thermal resistance of R-19 or greater. 2. Attic access doors shall have permanently attached insulation using adhesive or mechanical fasteners. The attic access shall be gasketed to prevent air leakage; and 3. Insulation shall be installed in direct contact with a continuous roof or ceiling which is sealed to limit infiltration and exfiltration as specified in Section 110.7, including but not limited to placing insulation either above or below the roof deck or on top of a drywall ceiling.” |
| 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.  The 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-sSF-mShellIns |
| Effective and Remaining Useful Life | BS-CeilIns  EUL= 20 years  RUL=EUL/3= 6.7 |
| GSIA | Def-GSIA |
| **Section 2. Calculation Methodology** | |
| Energy Savings/Peak Demand Reduction – All Measures | The base energy consumption and measure energy consumption values are directly from READI v.2.4.7 for RB-BS-CeilIns-VintR-AddR19, RB-BS-CeilIns-VintR-AddR11 and RB-BS-CeilIns-R0-R38. |
| **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 insulation; therefore, the base case cost is $0.00. |
| Measure Cost | The 2010-2012 WO17 Ex Ante Measure Cost Study provides ceiling insulation per-sqft costs. There are multiple line items but the one which seems most appropriate is “Ceiling R‐0 to R‐38 Insulation‐Batts assume 16" wide and 43 sqft per package”” because it matches the description of Measure 3 and has the highest cost. Therefore, this workpaper conservatively adopts the cost for Measure 1, Measure 2 and Measure 3.  The study provides costs per ton cooling for ceiling insulation of $0.72 for materials and $0.81 for labor for a total cost of $1.53/sqft. |

1. Itron. 2010-2012 WO017 Ex Ante Measure Cost Study Final Report. San Francisco, CA (2014, May 27). Retrieved 12/15/17 at <http://www.energydataweb.com/cpucFiles/pdaDocs/1100/2010-2012%20WO017%20Ex%20Ante%20Measure%20Cost%20Study%20-%20Final%20Report.pdf>. [↑](#endnote-ref-1)