



ENERGY EFFICIENCY PROGRAMS

Duct Sealing White Paper
Standard Work Specification for the Residential Program

5-3-2018

Duct Sealing Work Specification and Incentive Eligibility

To qualify for the incentive, the following duct system eligibility criteria must be verified by program allies and work specifications must be followed. Prior to submitting an incentive reservation request that includes duct sealing, please become familiar with the requirements outlined below, and the updated program forms.

Existing Duct System Eligibility

Incentives are provided for the reduction of heating system duct system leakage that occurs outside of the conditioned space, ducts located in walls, floors, conditioned basements, and fully conditioned crawlspaces are generally considered within the conditioned space.

To qualify for duct sealing incentives, all of the following criteria must be confirmed:

- 50% or more of the existing duct work for the home's **heating system** must be located in unconditioned space
- The heating fuel must be delivered by Ameren Illinois
- The duct work must be accessible to facilitate sealing.

All accessible leaks located on trunks, ducts, plenums, boots, seams and boot to drywall connections must be sealed. In practice, eligibility may be limited to systems where the ducts (supply and return) are located in unconditioned attic spaces, basements, or crawlspaces. Please contact a Field Energy Specialist if you have questions regarding eligibility of the existing system.

Quantifying Duct Leakage Reduction and Claiming Incentives

Duct leakage reduction will be quantified through use of the Distribution Efficiency Table published by the Building Performance Institute (<http://www.bpi.org/files/pdf/DistributionEfficiencyTable-BlueSheet.pdf>).

The procedure for quantifying duct leakage is as follows:

1. Perform a visual inspection of the distribution system and determine the existing system efficiency using the BPI look-up table, based on observation of leaks and insulation level. Record existing system distribution efficiency as a percentage. This will be needed to apply for incentives. Duct locations and efficiencies must be recorded on the “*Combined Work Scope/Incentive Application...*” when applying for the duct sealing incentive.
2. Perform Duct Sealing guided by the Duct Sealing measure in the Available Residential Measures guide and the Building Envelope Field Guide, which have been provided below for convenience.
3. Perform a second visual inspection of the distribution system to determine the post-installation distribution efficiency using the BPI look-up table. Record the results and enter both the pre-existing and post- retrofit distribution efficiencies on the program incentive application

Important Note: Duct system leakage reductions will result in a reduction of the overall “leakage to outside” for the building. Please conduct blower door testing in a manner that avoids capturing duct leakage reductions in the overall building leakage and airflow results. In most cases, this can be accomplished by obtaining the “initial” blower door reading after duct sealing has been performed, but prior to performing general building air sealing.

Duct Sealing Measure Description (excerpt from the Available Residential Measures Guide)

RM-18.1.2.8 - Duct Sealing

Description: Income Qualified Single Family Measure to provide incentive for the reduction of forced air duct system leakage that occurs outside of the conditioned space

Objective: To reduce energy losses from air leakage outside of conditioned space on a forced air system through a prescriptive approach

Initial Conditions: Existing forced air duct system currently being used for the heating of the residence that is located 50% or more in unconditioned space

Final Conditions: An increase in duct efficiency through the use of the BPI Distribution Look-Up Table and the Duct Sealing Work Specification found on www.AmerenIllinoisSavings.com

Allowed Materials: Water-based (latex) mastics conforming to UL-181A-P, UL-181A-M, UL-181A-H, UL-181B-M; mesh tape; 1-part or 2-part spray foam; and 100% silicone caulk as installed according to the Building Envelope Field Guide.

Work Specification for Duct Sealing (excerpt from the Building Envelope Field Guide)

Please reference section 3.5.2 *Duct Sealing* of the Building Envelope Field Guide for more details

3.5.2.1 - Air Sealing Duct System

Desired Outcome:

Ducts and plenums sealed to prevent leakage

3.5.2.1.3 - Existing component to existing component

Specification(s):

Seams, cracks, joints, holes, and penetrations less than ¼" will be sealed using [UL 181](#) fiber-embedded mastic

Seams, cracks, joints, holes, and penetrations between ¼" and ¾" will be sealed in two stages:

- They will be backed using temporary tape (e.g., foil tape) as a support prior to sealing
- They will be sealed using fiberglass mesh and mastic

Seams, cracks, joints, holes, and penetrations larger than ¾" will be repaired using rigid duct material

Mastic will overlap repair joint or existing temporary tape by at least 1" on all sides

Objective(s):

Eliminate air leakage into or out of ducts and plenums

Ensure adhesion of primary seal (fiberglass mesh and mastic) to the duct

Reinforce seal

Support fiberglass mesh and mastic during curing

Below is a chart adapted from the BPI Distribution Efficiency Table for Climate Zones in the Ameren Illinois Service Territory

NOTE: This chart starts from the standpoint that 100% of the ductwork is outside of the conditioned space.

| Attic | | Heating | Add if 50% - 75% Uncond. | Cooling | Add if 50% - 75% Uncond |
|-------------------------------|----------------|---------|-------------------------------------|---------|------------------------------------|
| | | CZ4-5 | | CZ4-5 | |
| R-0 | Leaky | 69% | 6% | 61% | 4% |
| | Average | 73% | | 64% | |
| | Tight | 77% | | 73% | |
| Up to R-3 | Leaky | 76% | 4% | 65% | 4% |
| | Average | 82% | | 74% | |
| | Tight | 87% | | 84% | |
| R-4 to R-7 | Leaky | 79% | 3% | 67% | 3% |
| | Average | 84% | | 77% | |
| | Tight | 90% | | 87% | |
| R-8+ | Leaky | 80% | 2% | 69% | 2% |
| | Average | 86% | | 79% | |
| | Tight | 92% | | 90% | |
| Unconditioned Basement | | Heating | Add if 50% - 75% Uncond | Cooling | Add if 50% - 75% Uncond |
| | | CZ4-5 | | CZ4-5 | |
| R-0 | Leaky | 93% | 2% | 81% | 2% |
| | Average | 94% | | 87% | |
| | Tight | 95% | | 94% | |
| Up to R-3 | Leaky | 94% | 1% | 83% | 1% |
| | Average | 96% | | 88% | |
| | Tight | 97% | | 95% | |
| R-4 to R-7 | Leaky | 95% | 1% | 83% | 1% |
| | Average | 96% | | 89% | |
| | Tight | 98% | | 95% | |
| R-8+ | Leaky | 95% | 0% | 83% | 0% |
| | Average | 97% | | 89% | |
| | Tight | 98% | | 95% | |
| Vented Crawl Space | | Heating | Add if 50% - 75% Uncond | Cooling | Add if 50% - 75% Uncond |
| | | CZ4-5 | | CZ4-5 | |
| R-0 | Leaky | 74% | 6% | 76% | 3% |
| | Average | 78% | | 83% | |
| | Tight | 82% | | 91% | |
| Up to R-3 | Leaky | 80% | 3% | 78% | 2% |
| | Average | 85% | | 85% | |
| | Tight | 90% | | 93% | |
| R-4 to R-7 | Leaky | 82% | 2% | 79% | 1% |
| | Average | 87% | | 86% | |
| | Tight | 92% | | 94% | |
| R-8+ | Leaky | 84% | 2% | 79% | 1% |
| | Average | 89% | | 87% | |
| | Tight | 94% | | 94% | |

Notes:

1. More than 50% of the ductwork for each individual unit must be in unconditioned space to qualify for duct sealing incentives.
2. All accessible duct work in unconditioned space must be sealed "Tight" and insulated to R-4.
3. Duct system efficiency is determined separately for heating and cooling systems.
4. Based on duct location, duct insulation R-value, and general leakiness, look up the duct system efficiency in the appropriate table.
5. For duct systems between 50% and 75% in unconditioned space, add the values listed in the next column.