# Loose-Fill Insulation: Preparation & Installation

# Weatherization Installer/Technician Fundamentals

Learning Objectives

By attending this session, participants will be able to:

* Summarize basic principles of air leakage.
* Identify typical air leakage sites in attics.
* List the various tools and materials used in air sealing and attic preparation.
* Explain high-temperature issues and how to treat them.
* Discuss safety concerns related to wiring.
* Describe exhaust fan ducting and termination requirements.
* Describe how to leave an attic air sealed and prepared for insulation.
* State the importance of following cost-effectiveness guidelines when insulating attics.
* Describe how proper attic treatment can save up to 20% of home heating and cooling bills.
* Explain how, combined with air sealing, attic insulation reduces the likelihood of structural damage due to condensation on the roof deck.
* Outline the process for insulating attics with loose-fill insulation on both horizontal and vertical surfaces.
* Demonstrate comparing material use to coverage required.

Key Terminology

Cubic feet per minute (CFM)

Direct leakage

Exfiltration

IC rated

Indirect leakage

Infiltration

Knob and tube wiring

R-value

Thermal envelope

Ventilation

Supplemental Materials

**Handouts & Resources**

Attic Insulation Certificate.

"Attic Prep and Insulation." *WxTV*. Montana Weatherization Training Center. <www.wxtvonline.org>.

Cellulose Coverage Chart.

Fisette, Paul. “Q&A: Causes of Attic Mold.” *Journal of Light Construction* Nov. 2004. <www.jlconline.com>.

Fisette, Paul. “Q&A: Roof Venting in a Wet Climate.” *Journal of Light Construction* Feb. 2011. <www.jlconline.com>.

Gill, Tony. "Math for Cellulose Volume Calculation."

Installer Attic Prop Guide.

Keefe, David. “Air Sealing in Occupied Homes.” *Home Energy* Nov./Dec. 1995. <www.homeenergy.org>.

Moore, Alex. "Loose-Fill Insulation Coverage Chart."

National Fire Protection Agency. "Combustion Clearance Tables." <www.nfpa.org>.

"Portable 2-Part Foam." *WxTV*. Montana Weatherization Training Center. <www.wxtvonline.org>.

Sample Attic Insulation Certificate.

Shapiro, Ian, and Timothy Lambert. “Sealing Attic Hatches.” *Home Energy* Sept/Oct. 2007. <www.homeenergy.org>.

U.S. Department of Energy. Weatherization Assistance Program. "Attic Air Sealing Video." 2009. <www.waptac.org>.

Van der Meer, Bill. “Air Leakage Control: The Devil’s in the Details.” *Home Energy* 21 Mar. 2006. <www.homeenergy.org>.

Van der Meer, Bill. “Air Leakage in Recessed Lighting.” *Builder Brief (BB0502).* Pennsylvania Housing Research Center, Pennsylvania State University. 2002. <www.engr.psu.edu>.

On-line Platform Lessons

Use these on-line interactive training modules as pre-requisites before students attend the course, or as in-class computer lab sessions. Users must first create an account at [www.nterlearning.org](http://www.nterlearning.org) to access.

i- 5.2 Introduction to Insulation Blowing Equipment <https://www.nterlearning.org/web/guest/course-details?cid=2005>

Relevant Standard Work Specifications

1.400 – Moisture (All details within this topic)

4.1000 – Attics (All details within this topic)

4.1301.7 – Pier House Subfloor Insulation – Loose Fill with Rigid Barrier

4.1301.9 – Open Floors Over Unconditioned Space and Cantilevered Floors, Floors Over Garages, Floors Over Unconditioned Crawl Spaces – SPF Installation

Classroom Props and Activities

Attic baffle

Cellulose sample

Dust mask and other safety gear (safety glasses, gloves, etc.)

Flashlight

Foam board

High temperature caulk

Insulation rulers

Mastic and gloves

Sample attic tag from cellulose bag

Sheet metal/foil/flashing

Spray foam

Stapler

Surveyors’ flags

Tin snips

Utility flags

Utility knife

Weatherstripping

Zip ties and tightening tool

**Attic Air Sealing Video**   
Discusses various air sealing materials, common sites for air leakage in attics, and one approach to insulating half-stories when knob and tube wiring is discovered.

**Floor Plan Sketch**   
Based on the hands-on prop you’ll use, have students do a rough sketch of the floor plan, noting locations of exhaust fans, recessed lights, chimneys, and any other issues installers should pay attention to in the attic.

**DOE Insulation Fact Sheet Web site** ([*www.ornl.gov/%7Eroofs/Zip/ZipHome.html*](http://www.ornl.gov/%7Eroofs/Zip/ZipHome.html))

* Use this interactive site to illustrate the principle of cost-effective levels of attic insulation.
* Demonstrate how the recommended R-value changes based on climate data. Enter local zip codes, then compare to recommendations for different climates.

Sample zip codes:

* Cold: 55401 (Minneapolis, MN)
* Mixed-Humid: 37902 (Knoxville, TN)
* Hot-Humid: 33109 (Miami, FL)
* Hot-Dry/Mixed-Dry: 85701 (Tucson, AZ)

Hands-On Props

**Installer Attic Prop**   
After demonstration, break students into teams of four. Have groups seal and insulate ducts, cap recessed lights, seal plumbing penetration, install proper attic hatch, seal and dam the flue, and air seal the entire prop. Stress that quality is more important than speed. The Installer Attic Prop Guide can assist the instructor with this activity.

Class Overview

* Use the presentation to review basic principles of air leakage. Introduce common tools and materials used in attic preparation and the trouble spots that installers will find repeatedly on a job site: flues, recessed fixtures, mechanical chases, etc.
* Convey expectations of a properly prepared attic as one that is air sealed with fixtures and juncture boxes marked, dams around high temperature areas, and safe wiring. Show the provided “Attic Air Sealing” video during the classroom portion of training.
* Demonstrate proper attic preparation on the installer’s attic prop. Break students into teams of four to gain hands-on experience with the prop. (See the Installer Attic Prop Guide)
* Demonstrate proper exhaust fan ducting and termination requirements. Ensure they vent directly outside with proper termination and with appropriate duct seals.
* Use the presentation and the DOE Web site to introduce the concept of cost-effective levels of insulation. Discuss proper installation techniques, the importance of covering every spot, and cleaning up after the job is done. Display insulation rulers, surveyor’s flags, and other classroom props as they are discussed in the presentation.
* Create a scenario by describing the size (area) of an attic and the location (city) of the house. Let students use the coverage chart to determine how many bags of insulation would be needed to bring the attic to the appropriate R-value for the climate. Calculate how much more it would cost to increase R-value by a certain level. Use this example to stress cost-effectiveness.
* Cover the different types of insulation—horizontal and vertical surface—highlighting the importance of complete coverage and not installing insulation where it will get wet. Explore different techniques for loose-fill insulation