# Moisture Barriers

Weatherization Installer/Technician Fundamentals

**Learning Objectives**

By attending this session, participants will be able to:

* Identify symptoms of moisture problems in houses.
* Name sources of moisture.
* State moisture terms and concepts.
* List moisture assessment tools and their functions.
* Demonstrate moisture barrier installation.
* Describe roof repair techniques.
* Identify flashing locations.
* State basement and crawl space retrofit options as related to moisture issues.
* Identify techniques for basement and crawl space retrofits.
* Demonstrate moisture assessment logic and list various moisture control strategies.

**Key Terminology**

Absolute humidity

Condensation

Crawl space

Dehumidification

Dew point

Evaporation

Grade

Hygrometer

Indoor air quality (IAQ)

Material safety data sheet (MSDS)

Moisture meter

Mud sill

National Institute for Occupational Safety and Health (NIOSH)

Relative humidity (RH)

Saturation

Thermal boundary

Vapor pressure

Vapor retarder

Vented crawl space

**Supplemental Materials**

Handouts & Resources

Aleshire, Vic. “Crawl Space Solutions.” *Home Energy* May/June 2004: 27-29. <www.homeenergy.org>.

“Building Science Basics.” *Health House Rx.* Feb. 23, 2001.

Dastur, Cyrus and Bruce Davis. “Closed Crawl Spaces Do Double Duty.” *Home Energy* Special Issue. 2005. <www.homeenergy.org>.

de Marne, Henri. “Q&A: Moldy Basement Room.” *Journal of Light Construction* July 1999. <www.jlconline.com>.

“Foundation Drainage Panels.” *Toolbase.org*. NAHB Research Center. <www.toolbase.org>.

Fugler, Don. “Dry Notes from the Underground.” *Home Energy* 19 June 2006. <www.homeenergy.org>.

Hales, David. “The SCARY Crawlspace.” *Home Energy* 5 Jan. 2011. <www.homeenergy.org>.

“How to Choose Weather-Resistive Barriers.” Toolbase.org. NAHB Research Center. <www.toolbase.org>.

Lstiburek, Joseph and John Carmody. “Fundamentals of Moisture in Houses.” *Home Energy.* Nov./Dec. 1995. pp. 11-16. www.homeenergy.org.

“Managing Mold in Your Florida Home: A Consumer Guide.” Florida Solar Energy Center. www.fsec.ucf.edu/en/consumer/buildings/basics/moldgrowth.htm.

Occupational Safety and Health Administration. “Mold Fact Sheet.” 2005. http://osha.gov/OshDoc/data\_Hurricane\_Facts/mold\_fact.pdf.

Sample Weatherization Mold Inspection and Release Forms.

Turk, Brad. “Crawlspaces, Considering the Options.” *Home Energy* May/June 2004: 30-33. <www.homeenergy.org>.

U.S. Department of Energy, Weatherization Assistance Program. “Energy-Related Mold and Moisture: Training Overview and DOE Guidance” PowerPoint presentation.

U.S. Department of Energy. Weatherization Assistance Program. "WPN 05-1 Energy Related Mold and Moisture - Training Overview and DOE Guidance."

U.S. Department of Energy. Weatherization Assistance Program. “Crawl Space Air Sealing Video.” 2009. <www.waptac.org>.

U.S. Environmental Protection Agency “A Brief Guide to Mold, Moisture, and Your Home.” www.epa.gov/iaq/molds/moldguide.html.

Van der Meer, Bill. “Avoiding Moisture Problems.” *WTC Technical Update 1*. Weatherization Training Center at Pennsylvania College of Technology. Feb. 2003. <www.pct.edu>.

Relevant Standard Work Specifications

1.400 – Moisture (All details within this topic)

Classroom Props & Activities

Cardboard

Damp rag

Digital manometer

Infrared camera

Insulation samples

Moisture meter

Moisture meters (contact and non-contact meters)

Personal protection equipment

Plastic (6-mil)

Small piece of dry lumber

Small piece of lumber that has been soaked in water overnight

**Moisture meter demonstration**Use the contact and non-contact meters to measure moisture content of the wet and dry lumber (or cardboard, if lumber is not available). The non-contact type will detect moisture-soaked materials behind materials that appear dry on the surface (e.g., drywall). Have fun—move it on your shirt and note that it will register a moisture reading on your body. Allow students to use the meters to test the moisture content of the dry and wet lumber.

**Crawl space air sealing video**Demonstrate laying vapor barrier and spraying crawl space walls.

**Humidity/dew point demonstration**Go through the definitions listed on slide #8. Do a simple demonstration to reinforce the principles of absolute humidity, relative humidity (RH), and dew point as follows:

* Take two clear plastic drinking cups of different sizes.
* Write the temperature of 75° on the larger cup and write 50° on the smaller cup. This indicates that 75° (the larger cup) will hold more moisture than 50° (the smaller cup).
* Pour water from a separate container into the larger cup until it is ¾ full. State that this simulates 75% RH. Now pour the water from the larger cup into the smaller cup until it overflows slightly. Spilling a little water adds drama and drives home the point that RH can never be more than 100% and water will always condense out when dew point is reached.
* Explain that this is an example of how colder air can hold less water than warmer air. The overflow simulates that dew point has been reached where water changes state from a vapor to a liquid state.
* Now pour water from the container into the 75° cup until it overflows, explaining that this is an example of how adding more moisture (absolute humidity) affects RH.

**Class Overview**

* Use the presentation and in-class discussion to teach students how to look for symptoms of moisture problems, sources of moisture, solutions to moisture problems, and tools used to diagnose moisture problems.
* Also use the presentation to introduce various types of foundations and common retrofit strategies for the various foundation types.
* Demonstrate moisture meters as described above.
* Show crawl space air sealing video after covering the topic in the presentation.
* Use props throughout the class lecture to maintain interest.