# Indoor Air Quality

# Weatherization Energy Auditor Single Family

Learning Objectives

By attending this session, participants will be able to:

* List the factors affecting IAQ.
* Describe the role moisture plays in IAQ.
* Discuss moisture movement.
* Formulate pollutant remediation techniques.
* Examine the impact of occupant behavior on IAQ.
* Describe the evolution of ventilation standards.
* Describe the requirements of ASHRAE 62.2 2010.

Key Terminology

Air changes per hour (ACH)

Air transport

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

Bulk moisture

Capillary action

Carbon dioxide (CO2)

Carbon monoxide (CO)

Climate zone

Cubic feet per minute (CFM)

Diffusion

Dilution

Elimination

Encapsulation

Indoor air quality (IAQ)

Lawrence Berkeley National Laboratories (LBNL, sometimes referred to as LBL)

Minimum ventilation guideline (MVG)

N-factor

Pascals (Pa)

Performance standard

Permeance rating

Porosity

Prescriptive standard

Radon

Relative humidity (RH)

Savings-to-investment ratio (SIR)

Sone

Zonal pressure diagnostics (ZPD)

Supplemental Materials

Handouts & Resources

ASHRAE 62.2 Checklist.

Boles, Bill. “Missteps with Mold.” *Home Energy* July/Aug. 2002. <www.homeenergy.org>.

Finet, Dave. “Restoring Indoor Health, One House at a Time.” *Home Energy* Jan./Feb. 2004. <www.homeenergy.org>.

Springer, David. “Is There a Downside to High-MERV Filters?” *Home Energy* Nov./Dec. 2009. <www.homeenergy.org>.

Tsongas, George. “Building Tightness Guidelines: When Is a House Too Tight?” *Home Energy* Mar./Apr. 1993. <www.homeenergy.org>.

U.S. Department of Energy. ASHRAE 62.2 Curriculum. <http://waptac.org/Technical-Tools/Health-and-Safety.aspx>.

U.S. Department of Energy. Energy Efficiency and Renewable Energy. "Spot Ventilation Fact Sheet."

U.S. Department of Energy. Weatherization Assistance Program. “WPN 11-6 Health & Safety Guidance.” 12 Jan 2011 <www.waptac.org>.

U.S. Department of Labor. Occupational Safety and Health Administration. “Carbon Monoxide Poisoning QuickCardTM.” OSHA 3282 - 2005. <www.osha.gov/pls/publications/publication.athruz?pType=Types&pID=6>.

U.S. Department of Labor. Occupational Safety and Health Administration. “Mold Fact Sheet.” OSHA. 2005.

U.S. Department of Labor. Occupational Safety and Health Administration. “Mold QuickCardTM.” OSHA 3263 - 2005. <www.osha.gov/SLTC/molds/index.html>.

U.S. Environmental Protection Agency. Indoor Air Quality Web site. <[www.epa.gov/iaq](file:///C:\ORISE\ORISE%20Curriculum%20Meeting\Energy%20Auditor\Healthy%20homes%20building%20measures\www.epa.gov\iaq)>.

Vermeer, Kimberly. “Battling Childhood Asthma.” *Home Energy* July/Aug. 2006. <www.homeenergy.org>.

Walker, Iain. “Toxic Mold.” *Home Energy* Jan./Feb. 2005. <www.homeenergy.org>.

Werling, Eric. “How Do You Spell IAQ?” *Home Energy* Nov./Dec. 2007. <www.homeenergy.org>.

Online Platform Lessons

Use these online interactive training modules as prerequisites before students attend the course or as in-class computer lab sessions. To access the lesson, users must first create an account at [www.nterlearning.org](http://www.nterlearning.org).

a- 8.3 ASHRAE 62.2 <https://www.nterlearning.org/web/guest/course-details?cid=248>

Relevant Standard Work Specifications

3.1501 – Garage Openings

3.1602.7 – Duct Sealing, Return and Supply Plenums in Basements & Crawlspaces

6.6004 – Appliance Exhaust Vents

6.6188 – Special Considerations

Classroom Props & Activities

Various types of filters (high MERV, dirty window A/C unit filter from job, etc.)

Moisture meter

Sling psychrometer

**Moisture demonstration on the importance of occupant behaviors**: Discussing how much moisture is released into the air by various factors is often abstract. This demonstration makes the concept concrete using a pint glass, water source, and large container. Begin by describing a typical empty home with healthy IAQ and no moisture issues. Then introduce a series of factors (unvented heaters, gas range without a hood, air drying clothes inside, etc.) and pour the amount of moisture released each day by each element into a big container. (For a table, see Sources of Water Vapor slide, or the speaker notes for this section). As a finale, start pouring in the amount of moisture put into the air each day by the entire class (approximately 1 pint per 50 lbs.). Will the container overflow?

Class Overview

* Introduce the concept of IAQ and use the presentation to illustrate the relationship between IAQ, moisture, and energy efficiency. Display various filters and discuss the air-cleaning function.
* When discussing the many factors that introduce moisture into the indoor environment, use the classroom activity described above to demonstrate how much moisture that really is.
* Demonstrate use of the sling psychrometer to measure RH in the classroom. Demonstrate the use of a moisture meter to determine the moisture content of building components.
* Ask students for examples of each type of moisture movement (bulk moisture, capillary action, diffusion, and air transport) that they have encountered in homes.
* Discuss the DOE WPN guidance for dealing with mold when discovered in a client home.
* Discuss the evolution of ventilation standards and the rationale for the adoption ASHRAE 62.2 2010 ventilation standard.