# Mechanical Ventilation

# Weatherization Energy Auditor Single Family

Learning Objectives

By attending this session, participants will be able to:

* Describe the importance of maintaining healthy IAQ and combustion air, and the role of mechanical ventilation.
* Recognize that leaving homes leaky is not proper ventilation.
* Identify appropriate ASHRAE guidelines.
* Calculate building volume.
* Propose appropriate fan size based on static pressure.
* Name the guidelines of proper duct installation.

Key Terminology

Air changes per hour (ACH)

ASHRAE standards

Building tightness limits (BTL)

Carbon monoxide (CO)

Combustion air

Cubic feet per minute (CFM)

Equivalent duct length (EDL)

Heat recovery ventilation (HRV)

Home ventilation institute (HVI)

Indoor air quality (IAQ)

Minimum ventilation requirements (MVR)

N-factor

Off-gas

Spot source ventilation

Static pressure

Ventilation

Whole house exhaust ventilation systems

Supplemental Materials

Handouts & Resources

Appropriate ASHRAE guideline.

Area and Volume Calculation Worksheet.

Armanda, Larry. “Ventilation Strategies in Weatherization.” *WTC Technical Update* 1.8 (2006): Weatherization Training Center at Pennsylvania College of Technology. <www.pct.edu>.

Benewicz, Martha, and Robert Parkhurst. “Ventilation Standards at Work.” *Home Energy* Nov./Dec. 2005: 12-16. <www.homeenergy.org>.

Cutchin, Kelly and Anthony Gill. "ASHRAE 62.2 Checklist."

Installation Instructions from Various Ventilation Manufacturers.

LBL Climate Map.

MacPhaul, David and Christy Etter. “HVAC System Design for Humid Climates.” *WBDG.org.*National Institute of Building Sciences. <www.wbdg.org>.

U.S. Department of Energy. ASHRAE 62.2 for WAP Curriculum. <http://waptac.org/technical-tools/health-and-safety.aspx>.

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

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

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

**Relevant Standard Work Specifications**

6.6002 – Exhaust, Components

6.6003 – Exhaust, Fans

6.6102 – Supply, Components

6.6103 – Exhaust, Fans

6.6201 – Whole Building Ventilation, Air Flow Requirements

6.6202 – Whole Building Ventilation, Components

6.6288 – Whole Building Ventilation, Special Considerations

6.9901 – Codes and Standards Resources

Classroom Props & Activities

Assortment of bathroom fans, possibly removed from client homes

Two 2-liter bottles full of tap water

Two different sizes of cups

Various duct materials

**ACH Demonstration**

Materials – Two 2-liter bottles full of tap water, two different sizes of cups, somewhere to dump water.

Explain ACH and how it takes house size into account. Use the 2-liter bottles of water to represent how much air leaks through a house in one day. The different sized cups represent different sized homes. Pour water into the smaller cup, and then dump it out. Continue until one bottle is empty. Have students keep track of how many “air changes” the “small house” experiences, and then compare with the “large house” in the same way.

Hands-On Prop

**Duct Installation Prop**: Give students hands-on experience attaching, sealing, and insulating ducts with a simple duct prop.

**Class Overview**

* Use the presentation to introduce the concepts of IAQ, static pressure, and ASHRAE guidelines.
* Discuss the causes of indoor air pollution and possible health effects of poor IAQ.
* Use worksheets to give students practice calculating ventilation requirements based on the appropriate ASHRAE guideline. Conduct volume calculations on the board, and have students complete volume calculation worksheets.
* Orally quiz students on proper duct installation methods.