The Role of Air Sealing

National Association of State Energy Officials

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Richard S. Duncan, Ph.D., P.E.
Technical Director, Spray Polyurethane Foam Alliance

Overview

- Building Enclosure Functions
- Air Leakage in Buildings
- Air Barrier Materials
- Building Codes and Market Drivers

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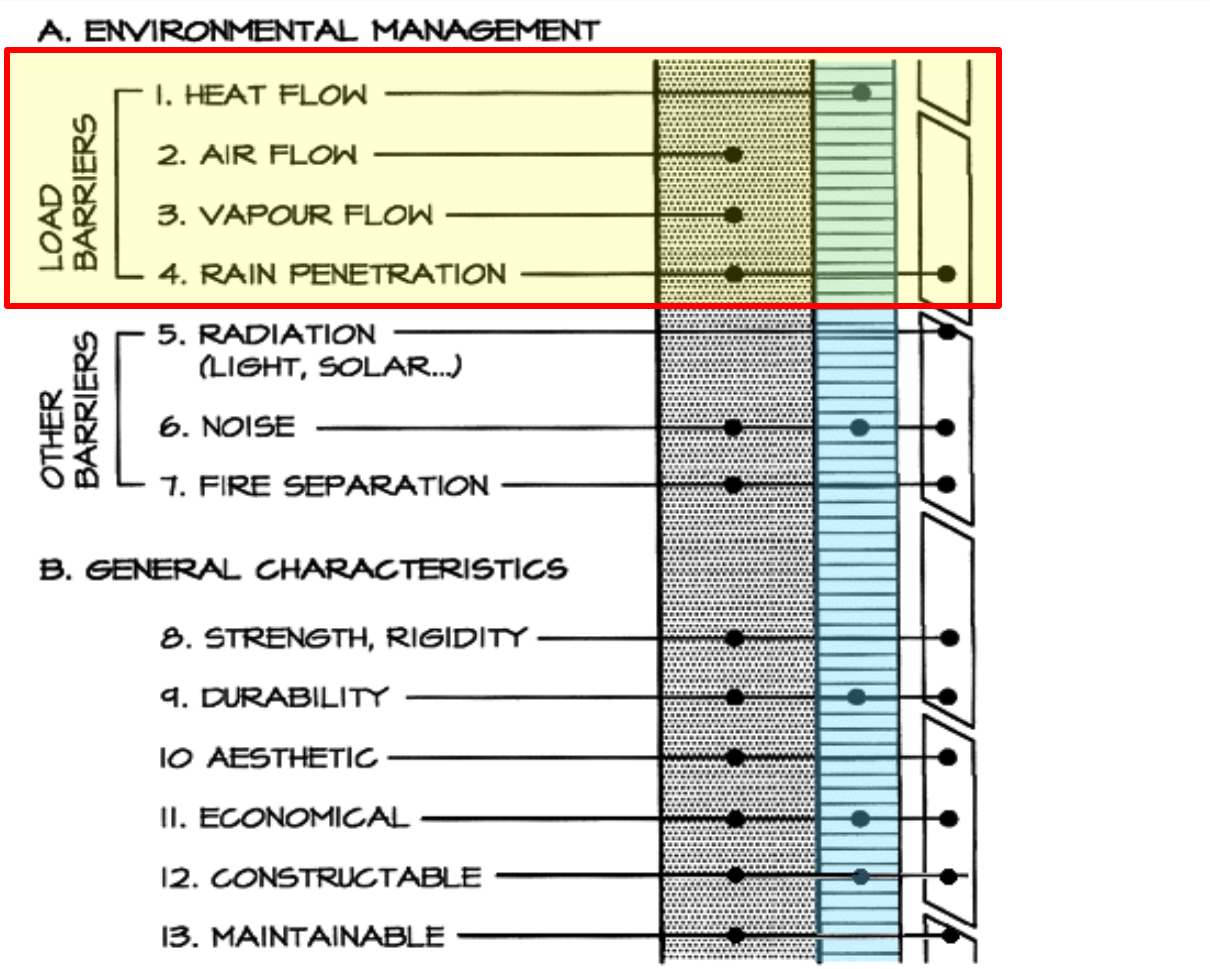
Building Enclosure Requirements



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Air Leakage in Buildings

- How it Occurs
- Impact
  - Health and Safety
  - Durability
  - Occupant Comfort
  - Heating and Cooling Costs

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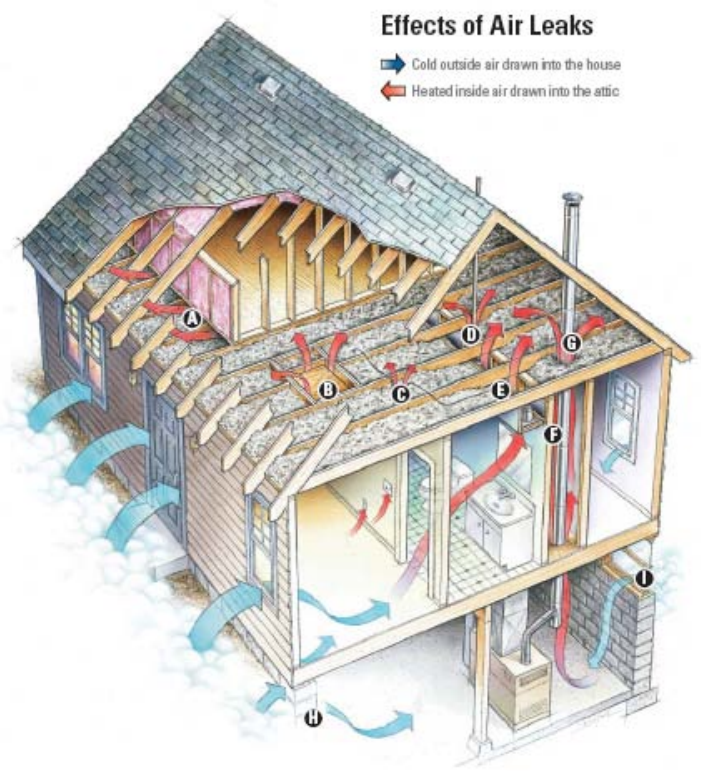
Air Leakage in Buildings: How it Occurs

Pressure differences drive air leakage

- Buoyancy or stack effect
- Wind Action
- Flues and Ventilation Systems

Air Leakage will cause…

- Poor indoor air quality
- Deficient control of moisture
- Loss of occupant comfort
- Increased energy costs



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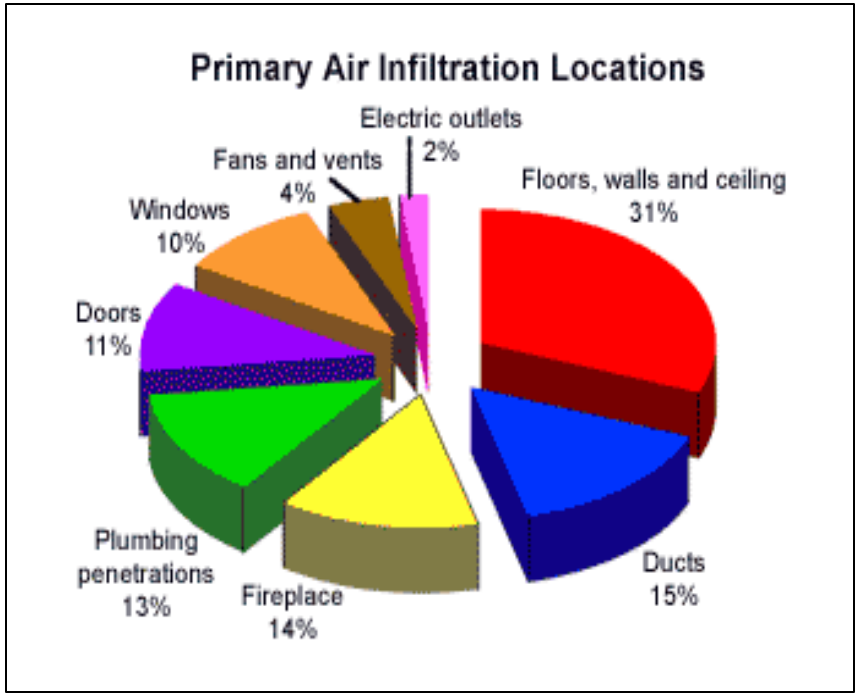

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Air Leakage in Buildings: Impact

- Health and Safety
  - Mold / Mildew
  - Structural Damage

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Air Leakage in Buildings: Impact

- Durability
  - Corrosion
  - Rot

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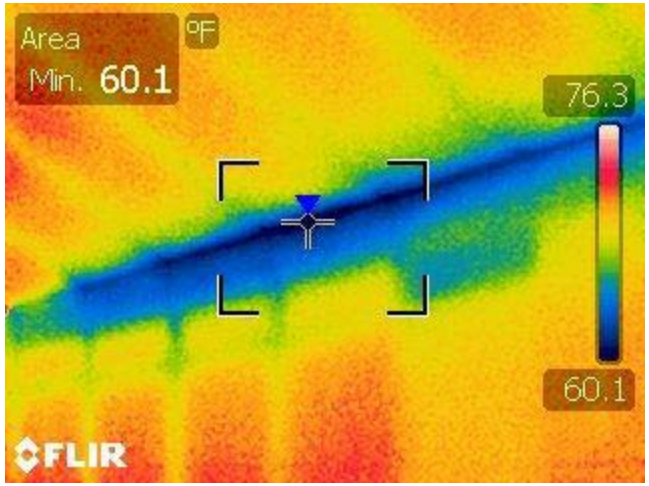
Air Leakage in Buildings: Impact

- Occupant Comfort
  - Cold Drafty Rooms
  - Poor Indoor Air Quality
  - Minimal Humidity Control



The average home has the equivalent of a 2 square foot opening due to the total discontinuities (cracks and gaps) in the building envelope.

This is equivalent to leaving a window fully open – year round!

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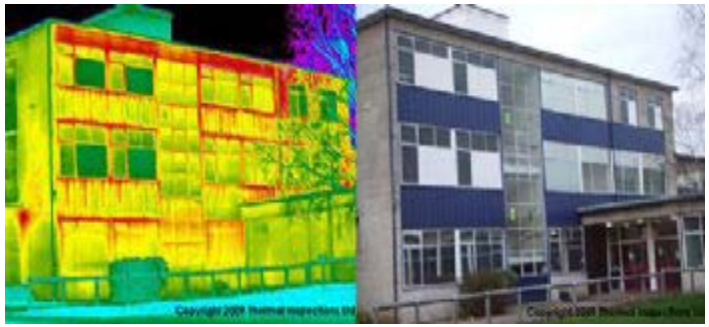
Air Leakage in Buildings: Impact

- Heating and Cooling Costs
  - Conditioned Air Loss
  - Humidity Control

According to DOE, unwanted air leakage can account for nearly 1/3 of the heating and cooling energy costs of a typical home



A recent NIST study shows that typical commercial buildings can reduce air leakage by more than 80% with air barriers….saving 25-40% in heating bills

(NIST Report 7238 - June 2005)

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Air Barrier Materials

- Air Barrier
  - A designated "plane" of reduced air flow between different environments
    - material / component
    - assembly
    - system
- Requirements
  - Low Air Permeance
  - Continuous
  - Structural/Durable

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Air Barrier Materials

SELF-ADHERED SHEET

FLUID-APPLIED LIQUID

FLUID-APPLIED SPRAY FOAM

THERMOFUSIBLE MEMBRANE

MECHANICALLY FASTENED (FILM/HOUSEWRAP)

MECHANICALLY FASTENED (BOARDSTOCK)

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Building Codes and Market Drivers

- State Codes
  - Adopted in MA, WI, MI, MN, GA, RI, FL
  - Consideration in NY, NC, SC, OR, CA
- ASHRAE 90.1
  - 2007: Proposed continuous air barrier in colder climates
  - 2008: Approved by ASHRAE, but overturned
- IECC
  - Requires sealing, no methods defined
  - Proposal (in progress) include continuous air barrier like ASHRAE 90.1 (submitted by AIA)

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Building Codes and Market Drivers

- Market Forces
  - ASHRAE/USGBC Standard 189 P for LEED
  - AIA 2030 Challenge
  - Army Corps of Engineers
  - GSA
  - Energy Security
  - Climate Change

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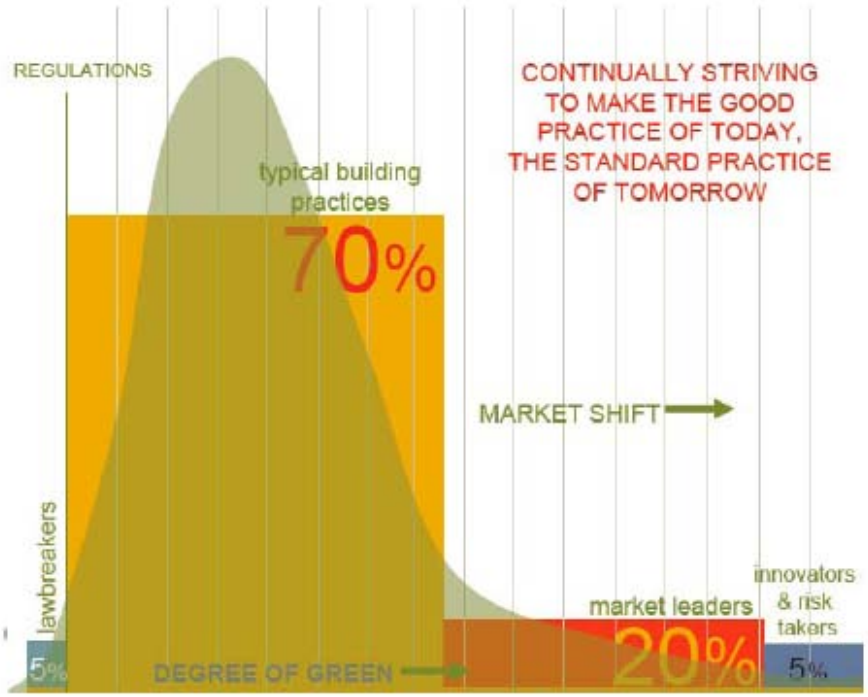
Building Codes and Market Drivers



Source: US Green Building Council

Air Barriers are a necessary component for all buildings to:

- Improve Health and Safety
- Increase Durability
- Enhance Occupant Comfort
- Reduce Energy Use and GHG

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Thank You!

- Questions?
- Comments?
- Suggestions?

To learn more…

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abaa
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america

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Relevant Codes and Standards

• ASHRAE Handbook of Fundamentals
• Envelope Design Guidelines for Federal Office Buildings: Thermal Integrity and Airtightness by Persily, A.K., NISTIR 4821 U.S. Department of Commerce. 1994.
• Massachusetts Energy Code for Commercial Buildings, 780 CMR, Chapter 13, 2001.
• National Building Code of Canada, NBC Chapter 5.

Additional References

• **Whole Building Design Guide - Products and Systems**

• Building Envelope Design Guide: Wall Systems, Cast-in-Place Concrete Wall Systems, Exterior Insulation and Finish System (EIFS), Masonry Wall Systems, Panelized Metal Wall Systems, Precast Concrete Wall Systems, Thin Stone Wall Systems

• Federal Green Construction Guide for Specifiers:
  01 57 19.11 (01352) Indoor Air Quality (IAQ) Management
  07 10 00 (07100) Dampproofing & Waterproofing
  07 20 00 (07200) Thermal Protection
  07 50 00 (07500) Membrane Roofing
  07 92 00 (07900) Joint Sealants
  Air Barrier Association of America

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