Lesson #2: High Performance Attics (3 Days)

Objectives

Students will be able to...

- Identify components of an attic assembly and describe the role each component plays in limiting heat transfer.
- Identify common insulation and air sealing materials and installation methods for high performance attics.
- Understand and demonstrate techniques for creating a high-performance attic assembly.

Common Core Standards

LS11-12.6
RSIT 11-12.2
Technology 4.1, 4.2, 4.3,
Problem Solving and Critical Thinking 5.1, 5.2, 5.3, 5.4
Health and Safety 6.3, 6.6,
Ethics and legal responsibilities 8.1,
Leadership and Teamwork 9.1, 9.2, 9.3
Technical Knowledge and Skills 10.1, 10.2, 10.3, 10.4
Demonstration and Application 11.1

Materials

- Handout or internet resources for lecture
  - 2019 Energy Code Requirements PowerPoint presentation (slides 6-45) https://www.dropbox.com/sh/oo48no9ip2bsn9v/AACD6ckm3eDKXqPudGNNQdfHa?dl=0&preview=2019+Energy+Code+Requirements.pptx
  - Application Guide: Residential Envelope and Solar Ready 2016 (refer to the 2019 Envelope and Solar Application guide when available)
    - Source: https://energycodeace.com/download/14949/file_path/fieldList/AppGuide.Res.Envelope_SolarReady.2016
  - WISE Warehouse video: Quality Insulation Installation
    - Applicable portions of video if not already used in learning objective 1
      - Attics: 18:42 to 24:56
    - Source: https://www.wisewarehouse.org/training-certification/training-resources/ or https://youtu.be/A4QzTZeZdLs

- Product Specific Guidelines for HPA and HPW in California
  - Source: https://www.wisewarehouse.org/wp-content/uploads/2018/05/Task-5.6_Product-Specific-Guidelines-for-HPA-and-HPW-in-California_FINAL.pdf
- Alternative: Selected slides from the WISE QII PowerPoint
  - Allows for a more customized approach and can limit the amount of additional information presented to limit confusion at this stage of the course

- Table 150.1A https://www.dropbox.com/sh/f5m098q15e0md7w/AADB11jecpAEFRIpm7ieXqiqa?dl=0&preview=2019+Table+150.1-A.Building+Energy+Efficiency+Standards.pdf

Lesson Sequence

- Lecture
  - Attic assembly components
    - Roofing material
    - Roof sheathing (with or without insulation)
    - Ventilation (presence or absence)
      - Ventilated attic is presumed in Energy Code
        - Unvented attic and rafter/cathedral roofs are also an option but have different requirements and considerations
      - Ventilation can be accomplished in many ways, such as
        - Gable end, soffit, ridge, eyebrow vents
    - Radiant barrier (presence or absence)
      - Laminated to underside of roof sheathing
      - Stapled in place under ceiling joists (less common)
    - Insulation materials (including but not limited to)
      - Fiberglass- batt, roll, blown
      - Cellulose- blown (wet or dry), dense packed
      - Spray foam- open cell, closed cell
      - Rigid board- EPS, XPS, Poly, mineral
      - Baffles (with ventilated cavity)
    - Insulation locations
      - Ceiling
      - Below roof deck
      - Above roof deck- less common, no longer prescriptive for 2019
    - Joists/trusses (top chord, bottom chord, scissor truss, raised heel "energy" truss etc.)
    - Interior finish
  - Heat transfer in an attic assembly
    - What impact do pitch, and orientation have on heat transfer in an attic?
    - High temperatures in attics in the summer can reduce efficiency of HVAC equipment if located in the attic

- Group discussion/activity
  - What makes an attic a “high performance” attic?
  - Discuss different strategies for constructing HPAs (above and below roof deck insulation), including insulation types, R-values and pros/cons for installing each.
    - Refer to: Product Specific Guidelines for HPA and HPW in California (source listed above).

Assessment

High Performance Attics Quiz

Accommodations/Modifications

One on One Support
Peer Support
Extra Time If Needed
Highlighted Material

High Performance Attics Quiz

1. A high-performance attic consisting of R-38 ceiling insulation and R-19 below roof deck insulation serves which of the following purposes?

    a. Increases attic temperature during winter months
    b. Reduced attic temperatures during summer months
    c. Increases attic ventilation at the eaves and ridge
    d. Reduces moisture from condensing under the roof sheathing

2. Which of the following is the most common form of installation of a radiant barrier?

    a. Radiant barrier laminated to the underside of roof sheathing
    b. Radiant barrier draped over the ceiling insulation
    c. Radiant barrier installed between the roof sheathing and below roof deck insulation
    d. Radiant barrier installed between the roof sheathing and the roofing material

3. Loose-fill insulation consisting of tiny bits of newsprint material is called what?

    a. Fiberglass
    b. Expanded polystyrene
    c. Cellulose
    d. Mineral wool

4. Which of the following is NOT a component typically used in the construction of a High-Performance Attic?

    a. Below roof deck insulation
    b. Roof trusses at 24” on center
    c. Powered roof vents
    d. Ceiling insulation

5. Which of the following components would typically NOT be found in an unventilated attic?

    a. Ceiling and roof framing members
    b. Below roof deck insulation
    c. Ceiling insulation
    d. Drywall air barrier

High Performance Attics Quiz – *Answer Key*

1. B
2. A
3. C
4. C
5. C