



WEATHERIZATION

TOPIC OF STUDY

Weatherization



90 MINUTES

KEY TERMS

non-combustible materials
(for around chimneys and flue
pipes)
fire code and safety
VOCs: volatile organic
compounds (solvents)

LESSON

LAB: Air Sealing Holes, Cracks, and Large Openings

BIG IDEA(S)

Air sealing and insulation aid in the control of air movement.

TASK LIST SUBCATEGORY

- 804 Identify infiltration and exfiltration points
- 806 Understand weatherization task including air sealing and insulation
- 810 Use energy efficiency industry vocabulary

OVERVIEW

There are many possible hole configurations in the upper thermal envelope of a house which needs to be sealed. This lab follows the introduction to sealing and insulation materials and is meant to provide a demonstration or laboratory experience with sealing. It may be necessary to review the kinds of sealing materials most frequently used in weatherization with an eye toward the laboratory work planned by the teacher. It is useful to have props to be sealed. As a demonstration, one prop is needed. For a class to repeat the demo, students should work in groups of 2 with one prop per group and appropriate sealing materials.

STANDARDS

PA/SDP

- 3.2.10.B3.** Explain how heat energy will move from a higher temperature to a lower temperature until equilibrium is reached. Analyze the processes of convection, conduction, and radiation between objects or regions that are at different temperatures.
- 3.4.10.B2.** Demonstrate how humans devise technologies to reduce the negative consequences of other technologies.
- CC.3.5.9-10.A.** Reading Specific Anchor (Key Ideas and Details): Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

OBJECTIVES

Students will:

- Identify the correct air barrier materials and sealants for specific jobs
- Describe the importance of understanding local code issues related to building readiness for work, fire code, and the where materials may and may not be installed
- Describe how to air-seal small and large openings as well as space around chimney or flue pipe
- Identify the reasons and way to clean-up, including hazardous materials, tools and equipment, and materials





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STANDARDS (CONTINUED)

NGSS

NGSS HS-ETS1-3. Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

INSTRUCTIONAL

TEXT/REFERENCES

Energy Conservation Handbook. pp. 225 - 228

MATERIALS NEEDED

Content: Sealing Jobs Worksheet

MATERIALS

- ECA Prop Panel with slot, large opening and two circular holes (demo for air sealing) or another prop

IMPLEMENTATION (LESSON PLAN)

- Warm-Up: Review sealing materials from Air Leakage lesson. From the photo list of sealing jobs provided in the Sealing Jobs Worksheet, choose the Tools, Consumables Needed, and Safety Equipment

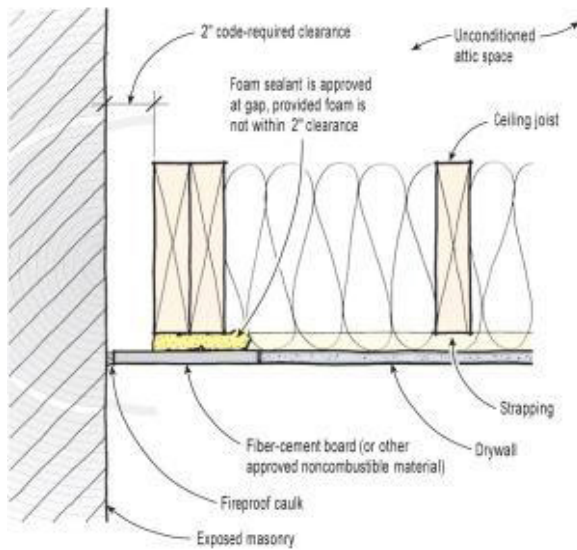
Prompt: *Let's see how much you remember about sealing and materials from previous lessons. Look at the jobs and decide what tools, consumables and PPE are needed.* Students may refer to the *Energy Conservation Handbook* (pp. 47-54 and 225-228) or just make guesses.

- Teacher procedures for the following:
 - Air-sealing cracks, gaps, and holes: <https://www.youtube.com/watch?v=XCHHRZFUnXI>
 - Air-sealing large openings: <https://www.youtube.com/watch?v=tmaWC7ZkVi8>
 - Air-sealing around chimney and flue pipe: https://www.jlconline.com/how-to/insulation/sealing-a-chimney-chase_o
- Live Demonstration: existing panel with a variety of openings similar to what is found in basement ceilings, attics, etc.
 - The prop shown on the right represents different opportunities to air seal and demonstrate how air sealing is done.
 - This is the open chaseway/bypass prop. The goal is to seal all the holes. To avoid filling the line, holes and the large opening separately, cover all of the openings and seal it. Choose an air seal material like a sheetrock, plywood, gypsum board, etc. Cut it so that the material will cover just beyond ½" beyond the openings. Screw material in place. Seal around edges with caulk.
- Review/demo clean-up of work area and storage of tools and materials.
- Student Lab Participation: a second period might be needed to have students work on a prop that needs sealing.



RESOURCES/LINKS

Fire Blocking Detail



When the chimney is exposed, an alternative is to cut back the ceiling drywall and patch in strips of noncombustible cement board, butting them to the masonry and sealing the gap with fireproof caulk (see illustration, left). Fire blocking is required at each level, at either the top or bottom of the joists, whereas draft-stopping is important primarily at insulated ceilings and floors that are part of the home's thermal boundary.



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