

4.1 AIR-SEALING ATTICS AND ROOFS

SWS Detail: 3.0101.1 Air Sealing Holes; 3.0102.2 Sealing High-Temperature Devices; 3.0102.1 Sealing Non-Insulation Contact (IC) Recessed Light; 3.0102.9 Sealing Dropped Soffits/Bulkheads; 3.0102.10 Sealing Dropped Ceilings

Air sealing attics and roofs may be the most important and cost effective weatherization measure and one of the most challenging. The attic or roof is a prominent location for air-leakage and moisture damage. Building fires tend to spread through large air leaks in the attic. Air-sealing can prevent these problems.

4.1.1 Sealing Vertical Chases and Chimneys

SWS Detail: 3.0101.1 Air Sealing Holes; 3.0102.2 Sealing High-Temperature Devices

Observe the following specifications when sealing vertical chases.

- ✓ Inspect the chase for damage and pest infestation. Repair and disinfect as necessary.
- ✓ Span the entire opening with a rigid material.
- ✓ Use structural supports like 2-by-4s or stronger lumber for spans more than 24 inches where the assembly may bear a person's weight.

- ✓ Seal joints and seams at the perimeter with a compatible sealant.
- ✓ Install only noncombustible materials and sealants with an ASTM E136 listing in contact with any device producing 200 degrees F or more: for example —chimneys, light fixtures, vents, and flues.

Install the chimney's air seal with an insulation shield if you'll retrofit insulation after air sealing.

- ✓ Remove existing insulation from around the manufactured chimney.
- ✓ Cut light gauge aluminum or galvanized steel in two pieces with half-circle holes for the chimney that create small caulk-able cracks.
- ✓ Bed the metal in sealant and staple, nail, or screw the metal in place.
- ✓ Caulk around the junction of the chimney and the metal and air seal with non-combustible caulk labeled ASTM E136.
- ✓ Cut and assemble a metal insulation shield that creates a 3-inch space between the shield and chimney and extends above the planned level of the retrofit insulation.
- ✓ Move the existing insulation that you removed back into place around the insulation shield before installing the retrofit insulation.



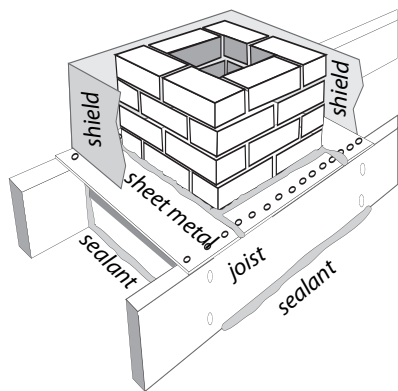
Sealing manufactured chimneys: When installing retrofit insulation in addition to air sealing, install a shield on top of the air seal that extends above the level of the new insulation.

Sealing around Masonry Chimneys

Leaks around fireplace chimneys are often severe air leaks. Use this procedure to seal air leaks through the chimney chase.

- ✓ Cut sheet metal to fit the gap that borders the chimney with overlaps connecting to nearby attic framing lumber.
- ✓ Bed the sheet metal air seal in sealant, and then fasten the sheet metal to the attic framing with staples, nails, or screws.

- ✓ Seal the metal patch to chimney or flue with a non-combustible sealant labeled ASTM E136.
- ✓ Seal other gaps between the attic and the chimney chase.
- ✓ For large chimney chases, cover the chase opening with structural material such as plywood. Maintain clearances between the structural seal and the metal or masonry chimney as listed in *“Clearances to Combustibles for Common Chimneys”* on page 339.



Sealing around chimneys: Chimneys require both an air seal and a shield if retrofit insulation is installed with air sealing.

4.1.2 Air Sealing Recessed Lights

SWS Details: 3.0102.1 Sealing Non-Insulation Contact (IC) Recessed Light; 3.0102.2 Sealing High-Temperature Devices

The most common type of recessed light fixture is the round can. However all recessed light fixtures are potential air leaks and air-leakage conduits. Many recessed light fixtures have safety switches that turn them off at around 150° F. Too much insulation covering the fixture or foam insulation could cause the safety switch to cycle.

Types of Recessed Can Lights

There are three kinds of recessed can lights found in buildings with regard to their need for insulation shielding. (IC means insulation contact. AT means airtight.)

1. Older cans that aren't rated for contact with insulation, known as non-IC-rated cans.
2. IC-rated cans that may be covered with fibrous insulation but not foam insulation.
3. ICAT-rated cans that are airtight in addition to being rated for insulation contact. The tightest ICAT fixtures have pin-based CFLs or LEDs.

Options for Sealing Non-IC-Rated Fixtures

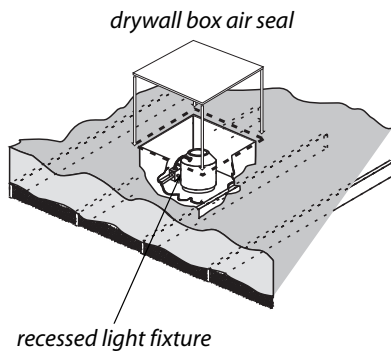
Consider these three options for air sealing recessed can lights. You can enclose the existing fixture, replace it with an ICAT recessed fixture, or retrofit it with an LED retrofit kit.

1. Build a Class I fire-resistant enclosure over the non-IC-rated fixture leaving at least 3 inches clearance from insulation on all sides and to the lid of the enclosure. Seal this enclosure to surrounding materials with foam to create an airtight assembly. The top of this fire-resistant enclosure must have an R-value of 0.5 or less. Don't cover the top of the enclosure with insulation.
2. Replace the recessed fixture with a new ICAT fixture, and carefully seal around this airtight fixture.
3. Install an airtight LED-retrofit assembly in the existing can. This option assures that the light is energy-efficient and low heat because you replace the existing incandescent lamp holder with a cooler LED retrofit assembly.

If the non-IC rated fixture remains, replace the incandescent lamp with a compact fluorescent lamp (CFLs) or LED lamp,

which operates cool and minimizes the fire hazard associated with these fixtures.

Caution: Don't cover IC-rated or airtight IC-rated fixtures with spray foam insulation. The foam's high R-value and continuous contact could overheat the fixture.



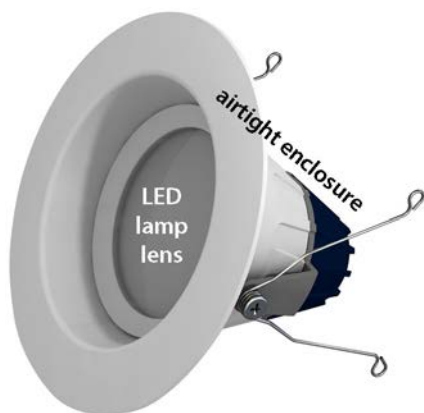
Air seal and shield for non-IC can:

This drywall box is an insulation shield and air seal, but allows the fixture some air circulation for cooling.



Low-air-leakage trim retrofit:

These kits employ a standard Edison base. Install a CFL or an LED in the base for maximum energy savings.



Airtight LED retrofit for can lights:

These retrofit fixtures provide a low-wattage LED with a low-air-leakage enclosure that inserts into the existing can light.

4.1.3 Sealing Stairways and Access Doors

SWS Details: 3.0102.11 Sealing Roof/Wall Connections; 3.0103.2 Exterior Roof Access Panels and Hatches; 3.0103.1 Access Doors and Hatches

There are a variety of stairways, hatches, and access doors that provide access from buildings to an unconditioned attics.

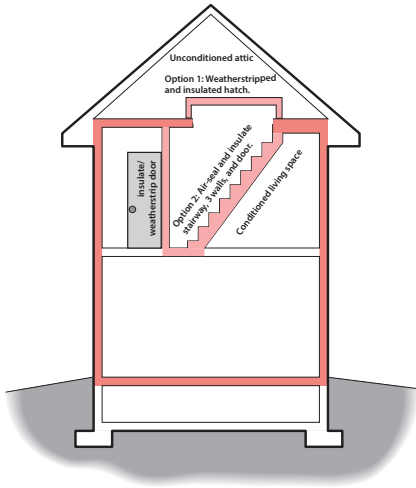
The following components of these locations may need air sealing and insulation depending on whether they are at the thermal boundary.

- The risers and treads of the stairways
- The surrounding triangular walls
- Vertical or horizontal doors or hatches
- The framing and sheeting surrounding the doors or hatches
- Sloping ceilings above the stairways

Consider the following air-sealing procedures.

- ✓ Study the geometry of the stairway and decide where to establish the air barrier and install the insulation.
- ✓ Weatherstrip around doors and hatches if the door or hatch is at the thermal boundary.
- ✓ Air seal and densepack the walls and underneath stair-stringers if the stairs define the thermal boundary.
- ✓ Seal gaps between the door frame and the framing with one-part foam, two-part foam, or caulking.
- ✓ If attic insulation is or will be above the level of the attic-access hole, build a dam that extends above the top of the insulation around attic access hatch. Build the dam strong enough to support the weight of anyone entering the attic. Air seal this dam to the surrounding structure of the attic access hatch.

- ✓ With existing insulation dams, clear existing fibrous insulation from around the dam and around the hatch framing. Spray two-part foam around the perimeter to reduce heat loss through the hatch framing.



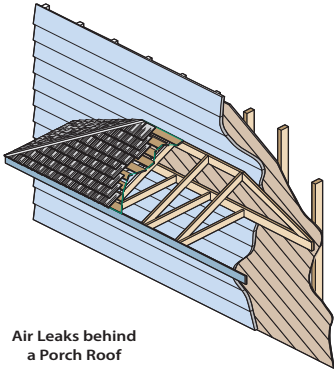
Stairways at the thermal boundary: The stairway may be within the thermal boundary or outside it. Only walls, ceilings, doors, and hatches at the thermal boundary require thorough air sealing. The door as shown is open.

4.1.4 Sealing Porch Roof Structures

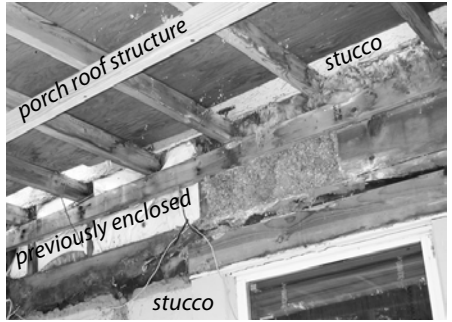
Porch roofs on older homes were often built at the framing stage or before the water resistive barrier (WRB) and siding were installed. The porch's roof sheathing, roofing, and tongue-and-groove ceiling aren't air barriers. The loosely fitting wall sheathing or unsheathed wall allows air into the wall cavities where it migrates into the conditioned space or convects heat into or out of the building.

Consider these options for air sealing leaks through a porch roof.

- Remove part of the porch ceiling and install a rigid air barrier or cover the area with closed-cell spray foam.
- Dense-pack the porch-roof cavity to reduce the airflow through the porch roof and wall cavities.



Air Leaks behind
a Porch Roof



Porch air leakage: Porch roof cavities often allow substantial air leakage because of numerous joints, and because there may be no siding or sheathing installed in the wall behind the roof and ceiling.