

OVERVIEW

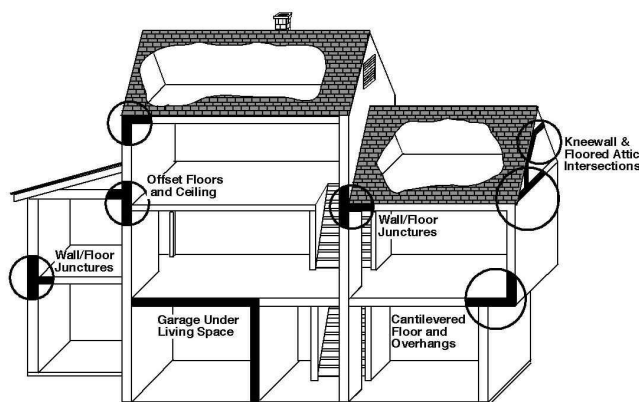
Sealing leaks in living spaces in homes can decrease drafts, increase comfort, and save energy, but most convective energy losses occur in attics and basements/crawl spaces. Thus, air sealing in these hard-to-get-to places is much more important from the standpoint of saving energy. The figure shows other areas where substantial air leakage occurs.

An energy auditor often finds areas like these, either by pressure testing when the blower door is operating or with an infrared scanner. In most cases, the best way to deal with these leakage areas is to hire a professional experienced in the “tube method” to install cellulose insulation to high density. This results in substantial reductions in both convective and conductive energy losses.

ATTICS

If ducts are in attics, it is important to both air seal and to insulate them. The “Skinny” on Ducts shows why and how.

- ☀ **Attic entrance:** Weather strip with sticky-back foam reinforced with staples. Insulate the back of attic hatches and doors using two-inch thick rigid board insulation cut to fit snugly.
- ☀ **Bypasses:** Attics often have open areas at the tops of interior walls through which cold air can descend, displacing warm air from below. If the leakage areas are small, caulk or urethane foam can be used to air seal these areas. If large, cut dead soft aluminum flashing to fit the area, lay down a bead of caulk or foam on the tops of the joists, then install the aluminum flashing with the aid of nails or (better) a hammer stapler.
- ☀ **Chimney chases:** Fire code calls for an air space between the chimney and any combustible building materials. Seal the opening in the attic with metal flashing caulked and nailed to the surrounding joists and seal the flashing to the chimney with high temperature caulk. Establish a barrier at least 2 inches from chimney to hold back any insulation.
- ☀ **Plumbing vent chases:** Seal around the pipe with clamps and special neoprene collars designed for that purpose or use plastic sheeting mechanically fastened around pipe and sealed to ceiling with staples and caulk. Foam can be used, but first grease the area to be formed with Vaseline to allow the pipe to move with changes in temperature.
- ☀ **Other penetrations:** Seal electrical and plumbing penetrations at the level of the attic insulation with caulk or urethane foam, but don't foam electrical boxes or recessed light fixtures.



CRAWL SPACES AND BASEMENTS

☀ Plumbing/Utility Penetrations

A variety of service penetrations occur at header and foundation walls from dryer vents, water and gas pipes to telephone and TV cables. These can be sealed using caulk or foam from the inside, being sure to seal from the outside when there is risk of water penetration. The intersection of the main floor and joist header area is particularly susceptible to air leakage at the framing intersections, around service penetrations in the header areas, and at the basement ceiling where penetrations lead to the upper floors of the house or attic.

Air leakage should be controlled at the joint of the foundation and the sill plate, between the exterior sheathing and the sill plate, at the joint of the header and each joist, between the top of the header and the subfloor, from the basement into the header cavity through the open-face of the header area, and through subfloor cracks from the header cavity. Polyurethane caulk is often appropriate for this joint unless it is larger than 1/4 inch, in which case urethane foam is a good choice. The entire length of the joint between the sill plate and the top of the foundation wall should be sealed.

In a balloon-frame configuration, if a fire stop blocks the stud cavity at the main floor it should be caulked in place. If no fire stop exists, batt insulation should be installed in the header space to completely fill the area so it will be slightly compressed when blocking is installed. Blocks of rigid insulation (like polyisocyanurate) should be cut and fit tightly into cavities between joists, subfloor, and foundation wall and thoroughly caulked in place. Fire resistant material should be applied to blocking if needed.

In slab-on-grade applications, header air-sealing should focus at the interior floor/wall joint. If the crack is large, backer rods should be used before applying sealant. If there is sufficient clearance, the sill/slab joint should be caulked from the exterior as well. Penetrations into the main and upper floors should be sealed.

Another option is to fully air seal and insulate the entire rim joist area with 2-part urethane spray foam. Never apply this material next to areas where high heat or open flames might cause it to ignite.

MATERIALS

Acrylic latex caulk plus silicone is a good choice for all around good performance, long life, ease of tooling, and simple water clean up. Clear caulks are usually best for interior air sealing. Backer rod, which is flexible extruded polyethylene that looks like foam rope, should be used to fill deep cracks which are then sealed with caulk or foam-based sealant.

A variety of urethanes in cans are available; all require latex gloves to keep clean. Choose those with an expiration date far in the future. Two component caulks and associated application tools are excellent for large scale sealing and insulating.

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and “Insulating Your Home”**

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