

# Walls and Rim Joists

## Air Seal Wall Systems in Basements and Crawlspace



### SKILL SET

Be sure you have the experience needed for this job. If you are in doubt, hire a contractor.

### SAFETY

These job tasks require working in tight clearances and under task lighting. Use a dust mask/respirator, gloves, safety glasses and kneepads.

### TOOLS

Utility knife, table or circular saw, caulk gun, measuring tape, lights, straight edge and markers

### MATERIALS

- Foam/caulk/construction adhesive/duct mastic
- Insulation – cavity batts or rigid foam board insulation
- Sheathing – OSB/plywood or code-approved foam board
- Fasteners – screws with washers or button-capped nails

### COST BENEFIT

Air sealing, combined with insulation in basements and crawlspaces reduces heating and cooling costs, improves comfort and indoor air quality.

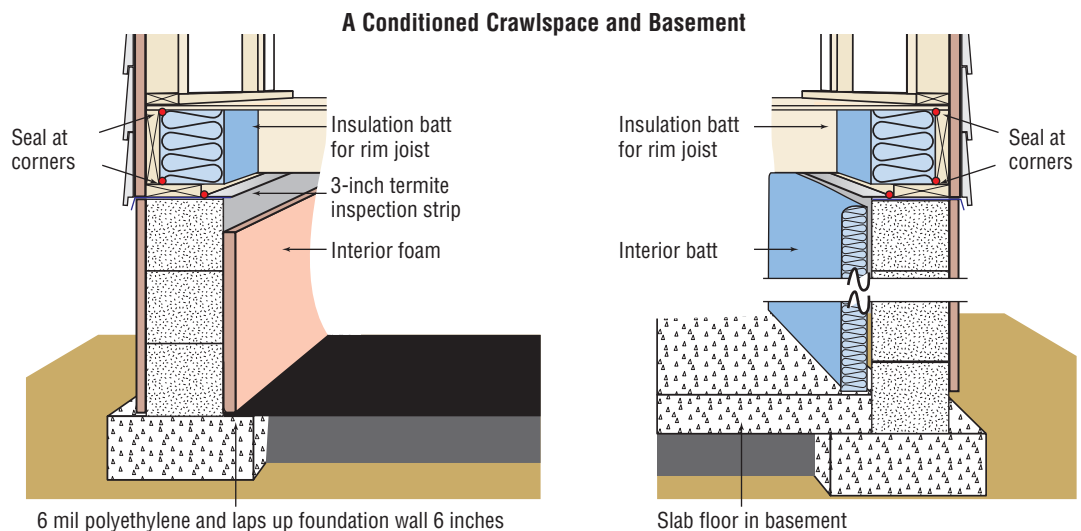
#### PRIORITY LEVEL

LOW MED **HIGH**

#### SKILL LEVEL

**DIY** PRO

**Air sealing** and then **insulating** framed floor assemblies over basements and crawlspaces represent one of two options on how to define the thermal envelope at the foundation. The other approach is to condition or indirectly condition the basement or crawlspace and thus air seal and insulate the foundation walls.



*Create an environment with no bulk moisture intrusion (rain, drainage) and low-humidity in your basement/crawlspace. Cover exposed dirt floors with heavy-duty plastic. Overlap seams and extend edges up vertical walls and pillars and seal plastic. Seal all gaps in the perimeter wall to control air infiltration to the space.*

There are numerous advantages to air sealing and insulating the foundation walls and then directly or indirectly conditioning the basement/crawlspace, including:

- Ductwork and air handler losses are minimized since they are now inside the thermal envelope
- Piping is less likely to freeze inside the thermal envelope
- Overhead main floor is usually warmer in winter and experiences fewer drafts
- Continuous air barrier/insulation on foundation walls is usually more effective than subfloor efforts yield
- Slight cooling benefit in the summer due to ground coupling of space
- Reduced entry paths for insects and pests
- Storage of items in a more stable environment
- Future basement renovations creating a finished livable space are already on the right track

Determining the thermal envelope at the walls of the foundation requires that proper exterior moisture details have been implemented, including:

- Site drainage and proper slope for downspouts away from the foundation walls
- Grading at the interior and possibly installing a low point sump pump to remove bulk water in the event of flooding
- 100% coverage of a 6-mil or better (fiber-reinforced is highly recommended) plastic vapor barrier that is overlapped and sealed at the seams and to the foundation walls

These items are needed for proper interior bulk moisture management. Basements usually have a concrete floor poured over the plastic.

Perform a visual inspection for obvious signs of pest (termites, rodents, snakes, etc.) or moisture damage and consult a professional if needed. Confirm that your current pest control company will be able to inspect the space or switch to another pest control contractor.

## Foundation Wall and Rim Joists

Foundation wall materials are typically masonry brick filled-in between structural concrete piers, concrete masonry unit (CMU) blocks and solid poured concrete foundation assemblies. On newer homes, technologies such as insulated concrete forms (ICF) have been installed either for foundation walls alone or for all above grade walls as well. Occasionally an All Weather Wood (AWW) foundation wall may be encountered.

More than likely an existing foundation wall is exposed and readily available to begin air sealing which should always be performed before any foundation wall insulation is installed. Common examples of foundation wall air sealing locations include:

- Utilities such as water, sewer and gas lines
- Wiring for electrical and other low voltage applications (phone, cable, security, etc.)
- Exhausts for
  - HVAC and Hot Water flue pipes
  - Clothes dryers
  - Kitchen down-draft vents
  - Radon vents
- Intakes for
  - Combustion air
  - Intentional whole house ventilation air
- Mechanical penetrations such as refrigerant and condensate lines
- Windows and access doors through the foundation wall into the basement/crawlspace
- Rim joist – seams and penetrations

- Pre-existing foundation vents (common in crawlspaces that have previously been vented and need to be enclosed) that will need to be blocked off
- Separation walls that may need to be constructed to partition off the now conditioned foundation from other unconditioned foundations, such as underneath a porch

Penetrations and seams are the primary targets for air sealing the foundation walls. A two-part foam “froth pack” or a reusable one-part foam gun with replaceable canisters are ideal tools for air sealing cracks, seams and small penetrations from underneath the subfloor. A caulk gun may work in some applications as well as sealing paste material such as duct mastic.

**Combustion Concerns.** Standard efficiency combustion appliances, like gas furnaces and water heaters, require combustion make-up air. In an ideal world, a standard combustion appliance should be contained inside an isolated combustion closet with combustion air provided from the outside or the appliance should be converted to a sealed combustion or a direct vent appliance that inherently receives its combustion air from the outside.

## Work Big-to-Small

Generally, when air sealing, the rule is to go after the big holes first, then the medium sized holes and finally the smaller cracks and seams. On existing homes, it may be easier to simply complete a section before moving on to the next part, working around the perimeter of the foundation wall and back to the beginning. If the gaps are small, ~ 1/4” or less, then caulk or mastic is an ideal sealant. Larger foundation gaps and cracks > 1/4” and up to several inches can be sealed using a foam gun. For openings too large for the canned spray foam to seal, a sheet material such as OSB/plywood or rigid foam board can be cut to fit and then sealed with caulk, adhesive or mastic.

## Seal Penetrations Through Foundation Walls

*Air conditioner condenser units have refrigerant and condensate lines that penetrate the basement/crawlspace. Higher efficiency HVAC and water heater units may have plastic vent pipes that intake and exhaust. Seal all these gaps.*

