Foundation Subfloor
Insulate Floor 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 tasks require working in tight clearances and under task lighting. Use a dust mask/respirator, gloves, safety glasses and kneepads. Wear a long sleeve shirt and consider applying baby powder to exposed skin before installing fiberglass to minimize itching.

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
Insulation, combined with air sealing in basements and crawlspace reduces heating and cooling costs and improves comfort and indoor air quality.

PRIORITY LEVEL
LOW
MED
HIGH

SKILL LEVEL
DIY
PRO

Floor Joists - Engineered or Dimensional Wood

If insulation has kraft paper vapor retarder, then install with paper next to subfloor

Ensure a snug fit with insulation touching the subfloor

Staves cut from rigid board insulation can rest on lip of I-beam and support insulation

Engineered I-beams require a longer stave

Wire staves support insulation

Insulate rim joist

A stave is a mechanical method of supporting insulation from the bottom-up. Placing extra wire staves may be required to ensure adequate contact of the insulation with the subfloor even if it results in more compression of the insulation. Whether the insulation is oriented parallel or perpendicular to the rim joist, make sure the rim joist has full height coverage. Consider removable insulation to allow for pest and termite inspection.

Air sealing and then insulating framed floor assemblies over basements and crawlspace represent one of two options on how to determine 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.

Subfloor Insulation Details
Before insulating the subfloor, consult the Air Seal Foundation Subfloor recipe card. Remember, only after air sealing has been properly performed should insulation installation commence.

If the home has insulation under the subfloor it should be removed in order to air seal. One strategy is to carefully remove any existing insulation from an area, perform necessary air sealing and then neatly replace the old insulation. The condition of the existing insulation will need to be assessed to determine the viability of reuse.

Another approach is to remove all the old insulation, perform the air sealing and begin with new insulation. Many older homes have never received any underfloor insulation and after air sealing has been performed, should be insulated to code approved values.

Extreme temperature variability, especially in warm seasons, can create moisture condensation issues in crawlspace. Proper air sealing between the living space and the crawlspace, plus a plastic vapor barrier over the crawlspace dirt, in addition to insulating the subfloor, helps to control temperature and moisture variations between the house and crawlspace.

Evaluate hazards and repair existing maintenance issues before proceeding including knob and tube wiring, exposed electrical junctions, asbestos, lead paint, radon, dust, mold, pest infestation and water infiltration. Always follow common-sense safety measures when working in tight crawlspace.
The most effective underfloor insulation technique is spray-applied foam. Unfortunately this approach is the most expensive and does not easily lend itself to a do it yourself (DIY) project from the high cost of equipment and training required for installers. The major benefits of underfloor spray-applied foam is that it air seals and insulates in one application and should stay in place and be durable in terms of moisture. Besides the high installed cost, other disadvantages are that insulated sections cannot be easily removed and replaced and water piping below will need to be insulated for freeze protection. Spray-applied foam applications should be well ventilated and the homeowners may need to vacate the premises for 24-48 hours if they are sensitive to chemicals present in the foam.

**Open-celled spray foam** generally costs less per installed R-value and requires greater thickness to achieve a specified R-value compared to closed-cell. Generally 5-6” of open cell foam is required to achieve an R-19; often this is enough thickness to encapsulate (and offer freeze protection) for many water pipes. **Closed cell foam** offers higher R-value per inch (~3” yields an R-19) and acts as an enhanced vapor retarder due to its lower moisture permeability.

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