

# Foundation Subfloor

Insulate Floor Systems in Basements and Crawlspaces

## 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 crawlspaces reduces heating and cooling costs and improves comfort and indoor air quality.

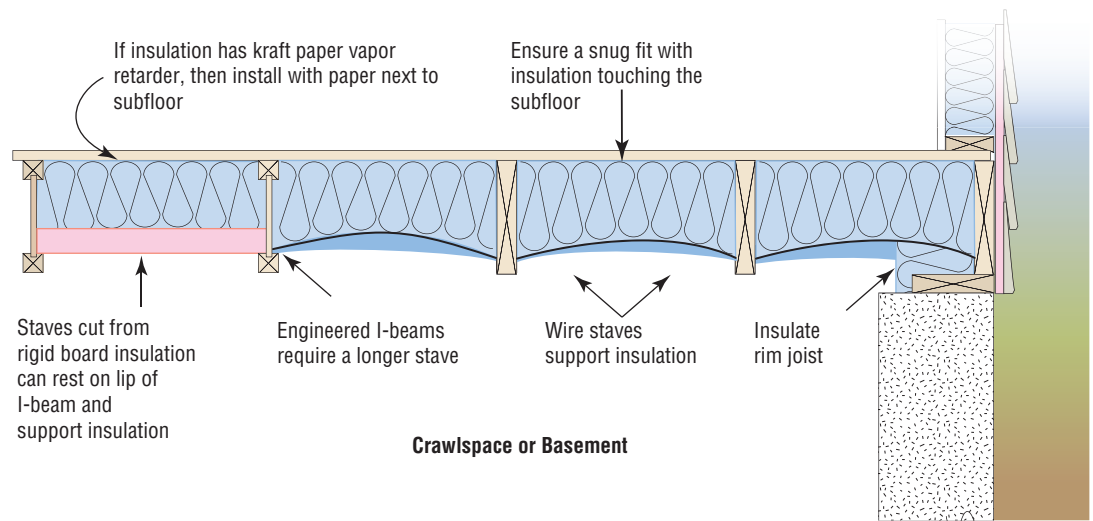
### PRIORITY LEVEL

LOW MED HIGH

### SKILL LEVEL

DIY PRO

## Floor Joists - Engineered or Dimensional Wood



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.

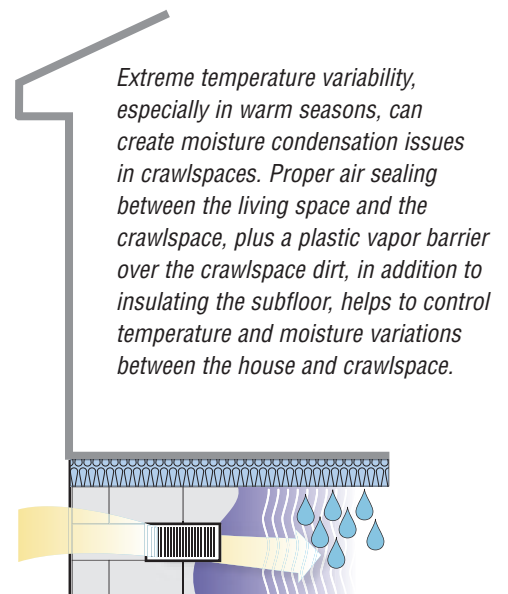
Air sealing and then insulating framed floor assemblies over basements and crawlspaces represent one of two options on how to determine the thermal envelope at the foundation. The other approach is to condition or indirectly condition the basement or crawlspace and thus air seal and insulate the foundation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

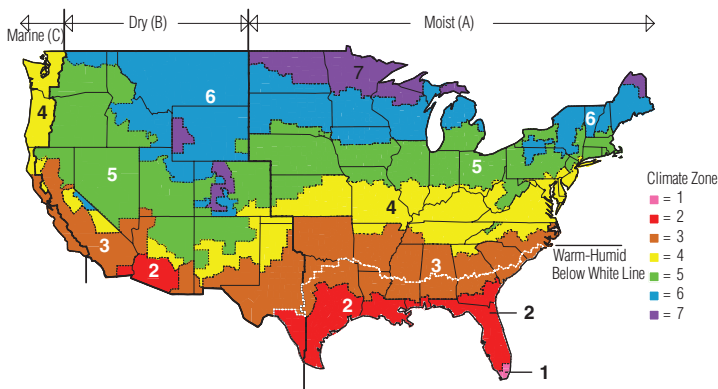
## Subfloor Insulation Details

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.





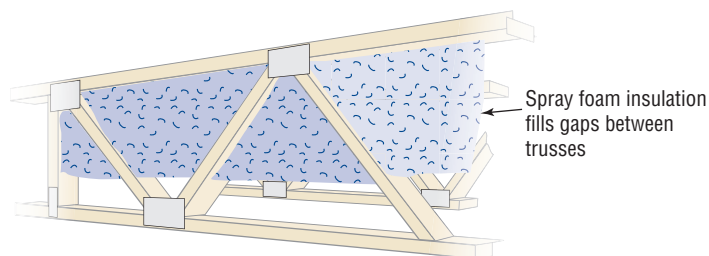
### Floor Insulation R-values - 2012 International Energy Conservation Code

Recommended R-values for floor insulation is as shown for each climate zone.

Energy Code Climate Zone	1-2	3-4*	5-6	7-8
Floor R-value	13	19	30**	38**

\*Except Marine 4 (treat Marine 4 as Climate Zone 5-6)

\*\*Or insulation sufficient to fill floor framing cavity, min. R-19



Consider using a spray foam insulation approach with web truss floor systems since the trusses provide a complex “puzzle” for insulating with batts.

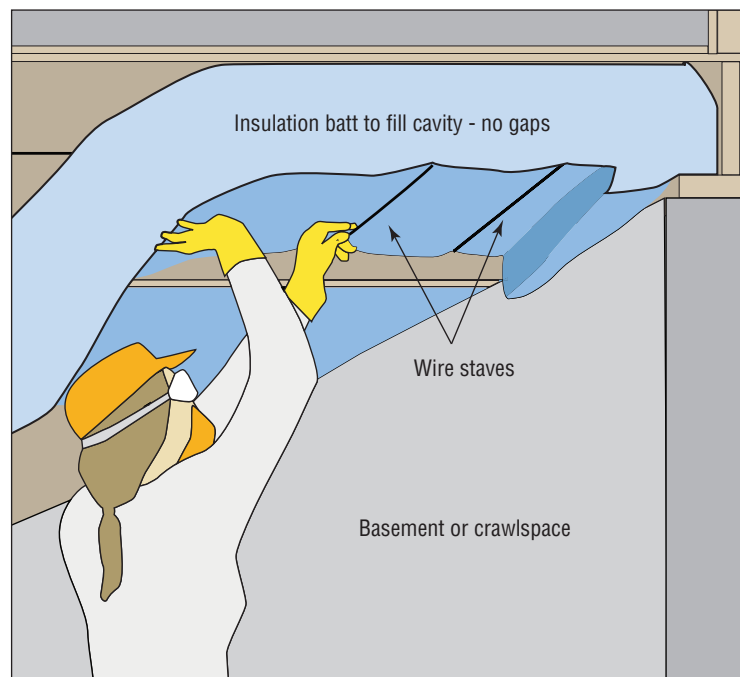
### Spray-Applied Foam

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.

### Insulation Batts

Batt insulation is the most common approach to underfloor insulation and can be done by most DIY-ers. The batts are usually fiberglass although other materials such as mineral wool, cotton and cellulose have been produced as batts. The most important detail is to obtain complete coverage with minimal compression and in complete contact with the underside of the subfloor decking. Another important detail is to install batts securely so they will remain in contact with the subfloor air barrier and not fall down.



Air seal first if not done already. Wear proper safety attire and light your workspace. Plan and stage your work to minimize trips and be sure to measure your joist spacing to ensure you have the right length wire staves.

Wire staves (sometimes known as “lightning rods” or “tiger teeth”) are the most common means of holding a batt up against the subfloor. Wire staves should be spaced no more than 18” apart and not excessively compress the batt. However, it is more critical for a successful install to be secure and lasting by placing extra wire staves, even if it results in more compression of the insulation. Insulation should be cut to fit and not overly compressed in any cavity. A batt that fills the frame floor cavity is ideal.

Batts typically come in unfaced or faced with an asphalt-impregnated kraft paper which serves as a vapor retarder. Follow the manufacturer’s suggestions about locating the paper face – generally it will be up against the subfloor, known as the “warm-in-winter” side. Vapor retarders for floor insulation are not code required in warmer regions but are more useful in colder climate zones.

Installing batts on open web floor truss systems should generally be avoided. Open web trusses require too much custom fitting of wire staves for batt insulation in order to be a viable option. Spray foam is a better method for insulating under an open web truss floor.