

## References for slides on pros and cons of insulation

**December 16, 2014**

### Fiberglass Batt Insulation

Pros for this type of insulation include:

- Most batt insulation is comprised of 30---40% percent recycled material.  
<http://energysmartohio.com/plan-your-job/insulation-types>
- Sand is also used and is a rapidly renewable resource.  
<http://energysmartohio.com/plan-your-job/insulation-types>
- It is essentially non-combustible.  
<http://energysmartohio.com/plan-your-job/insulation-types>
- It is available everywhere.  
<http://energysmartohio.com/plan-your-job/insulation-types>
- It is fairly inexpensive.  
<http://energysmartohio.com/plan-your-job/insulation-types>
- It has a good R-value/inch.  
<http://energysmartohio.com/plan-your-job/insulation-types>
- In 2011, the EPA added subclassifications for [REMOVE DON'T KNOW WHAT THIS REFERS TO]

#### **Cons include:**

- Batts can be difficult to cut properly.  
<http://www.energyvanguard.com/blog-building-science-HERS-BPI/bid/47219/A-Visual-Guide-to-Why-Fiberglass-Batt-Insulation-Underperforms>
- It is not uncommon for the batts to be installed backwards.  
<http://activerain.trulia.com/blogsview/2499853/insulation-installed-backwards-->
- It is not uncommon for batts to be installed in a manner that leaves them too compressed.

<http://www.energyvanguard.com/blog-building-science-HERS-BPI/bid/36928/3-Problems-with-Fiberglass-Batt-Insulation-in-Floors>

- In areas difficult to cover adequately, just leaving some of the area exposed causes the

R value to drop significantly.

<http://homeguides.sfgate.com/disadvantages-fiberglass-insulation-91309.html>

<http://www.drenergysaver.com/insulation/wall-insulation/fiberglass-wall-insulation.html>

- It is difficult to install batts correctly around pipes, vents and outlets.

<http://www.greenbuildingadvisor.com/blogs/dept/musings/installing-fiberglass-right>

- Fiberglass loses R--value when it is compressed, overly “fluffed” or wet.

<http://www.drenergysaver.com/insulation/wall-insulation/fiberglass-wall-insulation.html>

- Mold and mildew can be a problem.

<http://homeguides.sfgate.com/disadvantages-fiberglass-insulation-91309.html>

- If not well held in place with furring strips or wiring, batts may fall or hang down.

<http://www.howstuffworks.com/how-to-insulate-a-house3.htm>

- Fiberglass when wet loses R-Value.

<http://homeguides.sfgate.com/disadvantages-fiberglass-insulation-91309.html>

- When wet become heavy and can fall to ground when not secured.

<http://www.drenergysaver.com/insulation/crawl-space-insulation.html>

- When secured wet batts can hold moisture against wood structure

<https://www.concretetreat.com/can-fiberglass-insulation-grow-mold/>

## **Spray Foam**

Spray Polyurethane Foam (SPF) both insulates and air seals;

[http://www.epa.gov/dfe/pubs/projects/spf/exposure\\_potential.html#curing](http://www.epa.gov/dfe/pubs/projects/spf/exposure_potential.html#curing)

SPF minimizes air infiltration that can generate air condensation and result in mold growth;

<http://www.spraypolyurethane.org/Main-Menu-Category/Consumers.aspx>

SPF is moisture resistant;

<http://polyurethane.americanchemistry.com/Spray-Foam-Coalition/CPI-PHIUS-Paper-Benefits-to-Foam.pdf>

SPF contains no formaldehyde;

[http://sprayfoamdangers.com/wp-content/uploads/2013/01/PHIUS-Spray\\_Polyurethane\\_Passive\\_Houses-21.pdf](http://sprayfoamdangers.com/wp-content/uploads/2013/01/PHIUS-Spray_Polyurethane_Passive_Houses-21.pdf)

SPF impedes entry of insects and pests;

<http://www.sprayfoampolyurethane.org/Main-Menu-Category/Consumers.aspx>

SPF is effective at high and low temperatures; and

[http://www.1sprayfoam.com/AT3\\_Oak\\_Ridge\\_Lab\\_SPF\\_vs\\_Fiberglass.pdf](http://www.1sprayfoam.com/AT3_Oak_Ridge_Lab_SPF_vs_Fiberglass.pdf)

SPF can help maintain a comfortable, constant temperature throughout the building;

<http://www.gofoaminc.com/spray-foam-insulation.php>

## Cons

- Homeowner must be out of house from 24-72 hours while foam cures.  
[http://www.epa.gov/dfe/pubs/projects/spf/exposure\\_potential.html#curing](http://www.epa.gov/dfe/pubs/projects/spf/exposure_potential.html#curing)
- Difficult to install correctly must have trained operator.  
[http://www.epa.gov/dfe/pubs/projects/spf/epa\\_niosh\\_osh\\_spfa\\_conference\\_presentation\\_february\\_2011.pdf](http://www.epa.gov/dfe/pubs/projects/spf/epa_niosh_osh_spfa_conference_presentation_february_2011.pdf)
- Ignition risk from welding and soldering after cured.

[http://www.epa.gov/dfe/pubs/projects/spf/exposure\\_potential.html#longterm](http://www.epa.gov/dfe/pubs/projects/spf/exposure_potential.html#longterm)

- Irritating fish-like odors when not installed properly.  
[http://sprayfoamdangers.com/wp-content/uploads/2013/01/PHIUS-Spray\\_Polyurethane\\_Passive\\_Houses-21.pdf](http://sprayfoamdangers.com/wp-content/uploads/2013/01/PHIUS-Spray_Polyurethane_Passive_Houses-21.pdf)
- Potential health risk when heating or grinding material  
[http://www.epa.gov/dfe/pubs/projects/spf/exposure\\_potential.html#potential](http://www.epa.gov/dfe/pubs/projects/spf/exposure_potential.html#potential)
- Reports of fires spontaneously starting after the **improper** installation of SPF due to excessive heat build-up from the exothermic reaction of the foam.  
<http://www.greenbuildingadvisor.com/blogs/dept/green-building-news/three-massachusetts-home-fires-linked-spray-foam-installation>
- Although slow to catch fire, fires involving SPF generate hydrogen cyanide, isocyanates, carbon monoxide, and amines.  
[http://www.epa.gov/dfe/pubs/projects/spf/exposure\\_potential.html#potential](http://www.epa.gov/dfe/pubs/projects/spf/exposure_potential.html#potential)
- High cost of installation

## **Rigid Foam**

### **Pros and cons from**

**<http://solar365.com/green-homes/insulation/rigid-foam-insulation-pros-cons>**

- Rigid foam offers very high R-values compared to loose-fill insulation, and some of the best among foam options. Ratings range from R-4 to R-6.5 per inch, even without a foil facing to improve matters.

- Some rigid foam products are water resistant and can be buried to insulate foundation exteriors.
- Expanded polystyrene board ( [EPS or "beadboard"](#) ) is the only type which does not use HCFCs in its production, so is the greenest choice.
- EPS can be bought with foil and plastic facings so that it is water resistant and can be used underground.
- Extruded polystyrene board (XPS or "blueboard") has a slightly higher R-value than EPS and is more resistant to moisture.
- Polyisocyanurate board ("polyiso") offers even better insulating value, reaching from R-6.5 to a massive R-8 per inch. It is the least ecological option (see below).
- Polyiso board is manufactured with various facings (plastic or aluminum, for example) to further improve its R-value.

## **Disadvantages**

- Rigid foam insulation in wall cavities must be tightly fitted to stop air infiltration.
- Joints between sheets and boards must be taped to prevent air flow.
- Rigid foam is susceptible to sunlight. UV rays damage it, so it must be stored and installed appropriately.
- The air bubbles inside expanded polystyrene board (EPS or beadboard) stop heat transfer but can accumulate moisture and thus become ineffective. A moisture barrier may be needed, depending on the installation location.
- Basic beadboard is too brittle to be used underground.
- Extruded polystyrene board (XPS or blueboard) uses HCFCs in its production, which deplete the ozone layer.
- Polyisocyanurate board (polyiso) uses the worst HCFCs in its production.
- Polyiso suffers from decreasing R-values over time. At installation it can reach R-9 per inch but, over the following 2 years or so, will reduce to R-7. Foil facing adds R-2 to that.