



An Overview of Insulation Options

There are many insulation options beyond the conventional fiberglass batts. These alternatives can have much higher R-values and may be healthier for your home as well.

Insulation and its *R-value*

An insulation material's efficiency is measured in terms of its *R-value*. An R-value represents a measure of thermal resistance, or the ability to resist the flow of heat. Materials with higher R-values are more effective insulators.

The Sustainable Building Program recommends insulating at the following levels:

- Ceilings: Trusses R-38, Rafters R-30; R-49 recommended
- Walls: R-21; R-24 recommended
- Floor: Minimum R-30
- Basement/Crawl Space Walls: R-13

Insulation Materials and Health

Although an insulation has a high R-value, it may not be the right choice for you. Some materials include chemicals, like formaldehyde, that can compromise the indoor air quality of your home. Other insulation materials are produced using CFCs and HCFCs, which are green house gases that contribute to ozone depletion.

An ideal insulation will be efficient and environmentally safe. Be sure to know the contents of the material, the impact it will have on indoor health, and the effects its production process has on the natural environment.

Types of Insulation

There are four common categories of insulation: batt type, loose fill, rigid foam panels, and spray type. These insulation types have different applications and installation procedures. They also comprise an array of materials that have their own qualities and considerations.

The following tables breakdown and compare the different insulations types and materials. This guide provides a good introduction to insulation, however further research may be necessary before committing to a specific material.

Batt Type

Batt insulation is the most common option and is ubiquitous in existing homes. Although the traditional batt is made of fiberglass, many new alternatives have become available. Batt insulation typically features low R-values however it is inexpensive and easy to install without professional assistance.

Insulation Material	R-value per Inch	Appearance	Application	Pros, Cons and Considerations
Fiberglass	3.0 – 3.7	Fiberglass batts resemble fibrous blankets. Batt is long and wide enough to fit tightly between wall studs.	Unfinished walls, floors, ceilings	<p>Comparably inexpensive and readily available.</p> <p>Can be irritating to the skin. Conventional fiberglass off-gases formaldehyde.</p> <p>Formaldehyde-free fiberglass batts are available.</p>
Mineral wool	2.8 – 3.7	Same as fiberglass.	Unfinished walls, floors, ceilings	Better fire resistance and soundproofing qualities than fiberglass.
Cotton/Denim	3.0 – 3.7	Batts look similar to fiberglass. The fibers are larger and often the color of blue jeans. Material is fluffy and soft to the touch.	Unfinished walls, floors, ceilings	<p>Made from recycled materials. No VOCs and is healthy for your home. Will not irritate the skin.</p> <p>Not readily available.</p>

Source:
 Energy Savers (2009). "Types of Insulations." Resource available on-line at http://www.energysavers.gov/your_home/insulation_airsealing/index.cfm/mytopic=11510.
 Canada Housing and Mortgage Corporation (2009). "Insulating Your Home." Resource available on-line at http://www.cmhc-schl.gc.ca/en/co/maho/enefcosa/enefcosa_002.cfm.

Loose fill

Loose fill insulation should be installed by a professional, however rental equipment is available for DIY jobs. This insulation type is easy to install in finished areas as well as odd-shaped and hard to reach places. Loose fill can be made with recycled materials.

Insulation Material	R-value per Inch	Appearance	Application	Pros, Cons and Considerations
Fiberglass	3.0 – 3.7	A very light, fibrous fill. Often pink or yellow in color.	Enclosed existing wall cavities, open new wall cavities, unfinished attic floors, inaccessible places	<p>Impacted by air movement in attics.</p> <p>Fiberglass can contain VOCs.</p> <p>Formaldehyde-free fiberglass is available.</p>
Mineral fiber	2.8 – 3.7	A very light, fibrous fill. Often brown in color.	Enclosed existing wall cavities, open new wall cavities, unfinished attic floors, inaccessible places	Does not settle over time; will retain its initial R-value.
Cellulose fiber	3.0 – 3.7	Fine particles often grey in color. Cellulose is more dense than glass or mineral fiber.	Enclosed existing wall cavities, open new wall cavities, unfinished attic floors, inaccessible places	<p>Made with recycled paper.</p> <p>Provides more resistance to air movement than other loose fill insulations.</p> <p>Settlement problems arise if not installed properly.</p>

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Rigid Foam Panels

Rigid foam panels have respectable R-values and can be made from recycled materials. The panels are available in varying thicknesses, allowing for wider ranges of R-values. When selecting rigid foam insulation, be mindful that some materials are produced using CFCs and HCFCs. Try to choose an insulation that does not contribute to ozone depletion.

Insulation Material	R-value per Inch	Appearance	Application	Pros, Cons and Considerations
Type I and II (expanded) polystyrene or EPS	3.6 – 4.4	White board of small foam beads pressed together.	Unfinished walls, floors, ceilings, unvented low-slope roofs	Typically no CFC or HCFC used in production. Must be covered.
Type III and IV (extruded) polystyrene or XPS	5.0	Commonly blue or pink foam board.	Unfinished walls, floors, ceilings, unvented low-slope roofs	Good for wet conditions and must be used below grade instead of expanded polystyrene. Acts as a strong vapor retarder. CFC or HCFC usually used in production. Must be covered.
Rigid fiberglass	4.2 – 4.5	Dense fibers, typically less rigid than polystyrene.	Unfinished walls, floors, ceilings, unvented low-slope roofs	Drains water away. Harder to find
Rigid mineral fiber	4.2 – 4.5	Similar to rigid fiberglass.	Unfinished walls, floors, ceilings, unvented low-slope roofs	Drains water away.
Polyisocyanurate	5.6 – 7.7	Foil-faced rigid foam.	Unfinished walls, floors, ceilings, unvented low-slope roofs	HCFC usually used in production.

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Spray Type

Spray insulation must be applied by specialized contractor. Spray insulation is easy to install in finished areas as well as odd-shaped and hard to reach places. All spray insulations fill cavities very well. Although more expensive spray insulation seals air gaps, eliminating most air leaks and making the final cost more competitive.

Insulation Material	R-value per Inch	Appearance	Application	Pros, Cons and Considerations
Wet spray cellulose	3.0 – 3.7	Fine particles held in place by a binder.	Enclosed existing wall cavities, open new wall cavities, unfinished attic floors.	Acts as a good air barrier. Allows for few to no cracks and gaps. Made of up to 80% recycled paper.
Polycynene	3.6	A soft, spray foam that expands into the cavity.	Enclosed existing wall cavities, open new wall cavities, unfinished attic floors.	Can act as the air barrier. Must be covered.
Polyurethane	5.8 – 6.8	A foam that expands into the cavity and sets rigid.	Enclosed existing wall cavities, open new wall cavities, unfinished attic floors.	Can act as the air barrier and vapor retarder. Must be covered. HCFC used in production.

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