

Types of Insulation



Purpose: To identify the different types of insulation, installation methods, uses and thermal resistance.

Introduction: A material and/or technique to reduce the transfer of heat and sound. A critical component for multiple code requirements. Including the building thermal envelope, sound attenuation, fire-resistant construction, and vapor retarder assembly. Assists in maintaining comfortable indoor temperatures and reducing energy consumption for heating and cooling.

Types of Insulation:

- **Fiberglass:** Man made fiber, can also be called fibrous wool or glass wool. Made from molten glass spun or blown into thin flexible fibers,
- **Cellulose:** A wood or paper-based product blown or injected into a space.
- **Spray Foam:** Combination of 2 liquid components polyol resin and isocyanate.
- **Mineral Wool:** Like fiberglass, made from rock or slag, offers some fire resistance.
- **Loose-fill:** Rock wool or slag wool.
- **Rigid Foam Boards:** Expanded polystyrene (EPS), Extruded polystyrene (XPS), Polyisocyanurate (Polyiso,ISO)

Installation Methods:

- Cavity
- Blown-in
- Blanket
- Continuous

Batt Insulation

Fiberglass Batt:



- Pre-cut flat pieces or rolls
- Made of glass fibers that uses a binder with it
- Faced or un-faced
- Designed to slide into cavities between studs
- May be included in a fire-rated assembly
- Generally installed in:
 - * Attics
 - * Crawlspace
 - * Walls (above and below grade)
 - * Ceilings

R-Value Average between 2.2 and 3.5 per inch

Stone Wool Batt:



- Pre-cut flat pieces or rolls
- Made of basalt rock and recycled slag
- Designed to slide into cavities between studs
- May be included in a fire-rated assembly
- May be used with metal buildings

R-Value Average between per inch

Blown-In Insulation

Blown-In Cellulose:



- Made of cellulose-based plant source
 - Wood
 - Newspaper
 - Cardboard
 - Other material
- This material is susceptible to mold and mildew.
- The material can weigh more, so structural integrity will need to be ensured.
- Blown through a hose, allows tight spaces to be filled to ensure a continuous thermal envelope.

R-Value Average between 3.2 and 3.8 per inch

Fiberglass Blow-In (loose fill):



- Blown through a hose, allows tight spaces to be filled to ensure a continuous thermal envelope.
- Loose fill of tiny fibers of glass woven together
- May be part of a fire rated assembly
- Generally installed in:
 - Attics
 - Walls
 - Ceilings

R-Value Average between 2.2 and 3.5 per inch

Spray Foam Insulation

Open Cell (low-density):



- >50% open cells, can shrink
- Can be an air barrier @ 4.5" thickness
- Requires ignition or thermal barrier

R-Value Average between 3.5 and 4.2 per inch

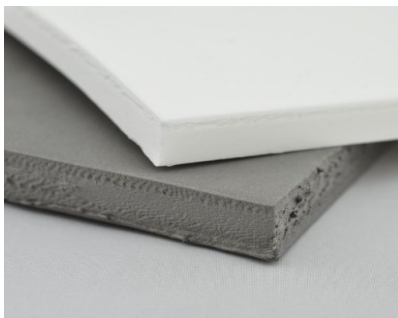
Closed Cell (mid-density):



- From foam plastic
- More rigid
- Air barrier @ 1.5" thickness
- Requires ignition or thermal barrier

R-Value Average between 6.0 and 7.0 per inch

Closed Cell (high-density):



- Often installed above roof deck

R-Value Average between 6.5 and 7 per inch

Rigid Board Insulation

EPS (Expanded Foam):



- Light weight made up of expanded beads.
- Can be utilized as part of the continuous insulation requirements

R-Value Average between 3.4 and 3.9 per inch

XPS (Extruded Foam):



- Made of various plastic resins and additives that expand into a shape.
- Can be utilized as an air barrier and continuous installation
- Often used for slab edge and under slab insulation

R-Value Average 4.7 per inch

Polyisocyanurate (Polyiso):



- Thermoset plastic in foam
- Can be considered an air barrier and continuous
- Mostly found above roof deck

R-Value Average between 5 and 7.2 per inch

Rigid Board Insulation

Fiberglass Rigid Board:



- Generally 4X8 foot panels
- Ranges in thickness from 1/4" to 2"
- Installed in cavity
- Often installed over sheathing or pre-cast concrete, using fasteners, adhesives or a combination of both

R-Value Average 4.2 per inch

Stone Wool Rigid Board:



- Installed as continuous insulation
- Made of basalt rock and recycled slag
- May be part of a fire rated assembly
- Generally installed in:
 - * Roofs
 - * Walls (above and below grade)

R-Value Average 3.8 - 4.3 per inch

Other Types of Insulation



Denim

- Made from recycled jeans and other denim items

R-Value Average between 3.0 and 4.0 per inch

Sheep/Lambs Wool

- Made from sheared wool of sheet that is too course for textiles

R-Value Average between 3.5 and 3.8 per inch

Hemp

- Made from fibers of hemp plant that is processed and combined with a binder

R-Value Average of 3.5 per inch

Mushroom (mycelium)

- Made from root structure of fungi (mycelium) and combined with agricultural waste materials

R-Value Average of 3.0 per inch